IMPROVEMENT OF SOFTWARE SYSTEM TEST PROCESS THROUGH STATISTICAL PROCESS CONTROL

İSTATİSTİKSEL SÜREÇ KONTROLÜ KULLANILARAK YAZILIM SİSTEM TEST SÜRECININ İYİLEŞTİRİLMESİ

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Ankara, September, 2007

Canset ALTUN

I hereby declare that all information in this document has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that, as required by these rules and conduct, I have fully cited and referenced all material and results that are not original to this work.

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ÖΖ

İSTATİSTİKSEL SÜREÇ KONTROLÜ KULLANILARAK YAZILIM SİSTEM TEST SÜRECININ İYILEŞTIRILMESİ

Canset G. ALTUN Başkent Üniversitesi Fen Bilimleri Enstitüsü İstatistik ve Bilgisayar Bilimleri Anabilim Dalı

Yazılım süreçlerinin gelişiminde istatistiksel metodların kullanılması, süreçleri ve onlara ilişkin nicel analizi iyileştirmek için gereklidir. Bu metodların uygulanabilirliği en uygun olan süreçlerden birisi de doğrulama ve geçerleme sürecidir.

Bu çalışmada bir proje kapsamında belirlenen test durumlarına, iki sistem test yöntemi (yol ve düğüm), prospektif (ileriye yönelik) şekilde toplanan veriler üzerinde, yöntemleri karşılaştırmak amacı ile istatistiksel metodlar kullanılarak analiz yapılmıştır. Uygulama sırasında daha önce sekiz çalışmada retrospektif (geriye yönelik) olarak kullanılan SPC-AM yönteminden ve istatistiksel araçlardan yararlanılmıştır.

Bu çalışma ile;

- 1. Sistem test süreci için belirlenen ölçümlerin yararını anlamak,
- 2. Kullanılan sistem test yöntemlerinin etkinliğini değerlendirerek daha etkin olan yöntemi belirlemek hedeflenmiştir.

Çalışma sonucunda sistem test süreci kapsamında uygulanan test yöntemleri için belirlenen ölçümlerin verileri kümeleme yöntemi ile gruplanarak değerlendirilmiş ve süreç için etkili olabilecek yöntemin belirlenen kısıtlara göre uygunluğu konusunda öneride bulunulmuştur.

Anahtar Kelimeler: Yazılım ölçümleri, istatistiksel süreç kontrolü, sistem test kapsam analizi

Danışman: Dr. Ayça TARHAN, Hacettepe Üniversitesi, Bilgisayar Mühendisliği Bölümü.

ABSTRACT

IMPROVEMENT OF SOFTWARE SYSTEM TEST PROCESS THROUGH STATISTICAL PROCESS CONTROL

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Application of statistical methods on software processes is a required capability to improve processes and their quantitative understanding. Verification and Validation process is one of the most applicable process for these statistical methods.

In this study, two different testing techniques (path and node coverage) are applied on the defined test cases of a project, and statistical methods were implemented prospectively (looking forward) to compare these two techniques on prospectively collected test case data. While implementing these statistical methods, an assessment model (SPC-AM) and statistical tools are used which had been previously implemented for eight different processes retrospectively (looking back).

This study aims to:

- 1. Understand the use of measurements defined for the system test,
- Identify which test coverage technique would be useful for the validation process by evaluating the effectiveness of two black-box test coverage techniques.

As a result; metric data for test coverage techniques are evaluated by applying process clustering, and suggestions were proposed on the effectiveness of the techniques under related circumstances.

KEY WORDS: Software Metrics, Statistical Process Control, System Test Coverage Analysis.

Supervisor: Dr. Ayça TARHAN, Hacettepe University, Computer Engineering Department.

TABLE OF CONTENTS

<u>Page</u>

A	CKNO	WLEDGEMENTS	i
Ö	Z		iii
A	3STR/	ACT	iv
TA	ABLE	OF CONTENTS	v
LI	ST OF	F TABLES	vii
LI	ST OF	FIGURES	viii
LI	ST OF	FABBREVIATIONS	x
1	ΙΝΤ	RODUCTION	1
	1.1	Overview	3
2	BA	CKGROUND	4
	2.1	Software Test Process	4
	2.1.	.1 Verification and Validation (V&V)	5
	2.1.	.2 Testing Methods	6
	2.1.2.	1 System Testing	9
	2.2	Software Process Management	9
	2.2.	.1 The CMMI Approach	11
	2.3	Software Measurement	15
	2.3.	.1 Software Process Measurement	16
	2.3.	.2 Why Measure?	17
	2.3.	.3 Measurement Scales And Scale Types	18
	2.3.	.4 Why do we need metrics?	19
	2.3.	.5 The Goal/Question/Metric Method (GQM)	20
	2.4	SPC	23
3	LIT	ERATURE REVIEW	28
4	AN	ASSESMENT MODEL FOR STATISTICAL PROCESS CONTROL	31
	4.1	Model Components	31
	4.2	Assessment Process	35
	4.3	Assessment Assets	37
	4.4	An Assessment and Analysis Tool for Statistical Process Control	42
5	CAS	SE STUDY	44
	5.1	Case Study A	48
	5.2	Case Study B	58

6	SUMMARY AND CONCLUSIONS	68
6.1	5.1 Discussion on Case Study Results	68
6.2	.2 Summary and Conclusion	70
REF	FERENCES	73

LIST OF TABLES

Table 1 Metric Usability Attributes used for Evaluating Metric Utilization	34
Table 2 The Interpretation of Path and Node Coverage at System Test Level	45
Table 3 Metrics (Base and Derived) used in the Case Studies	46
Table 4 Comparison of Test Methods by Standard Deviation Values	
in basis Cluster	68
Table 5 Comparison of Test Methods by Mean Values in basis Cluster	69

LIST OF FIGURES

Figure 1 The Software Testing Stages	5
Figure 2 Verification and Validation Process	6
Figure 3 Basic Node Testing Model Representation	7
Figure 4 Basic Path Testing Model Representation	8
Figure 5 Steps for Using Control Charts to Evaluate Process Stability [14] .	10
Figure 6 The Four Key Responsibilities of Process Management	11
Figure 7 Capability Maturity Model Integration (CMMI)	11
Figure 8 The CMMI model components	12
Figure 9 The activities of a GQM measurement programme [9]	20
Figure 10 The V-GQM Model	22
Figure 11 Control Chart Example	24
Figure 12 Florac/Carleton Approach for Process Measurement [24]	26
Figure 13 Process Attributes used for Stratification	32
Figure 14 The Assessment Process	35
Figure 15 Process Execution Record	38
Figure 16 Process Similarity Matrixes	38
Figure 17 Metric Usability Questionnaire and Rating for Base Metrics	40
Figure 18 Metric Usability Questionnaire and Rating for Derived Metrics	41
Figure 19 Process Execution Questionnaires	42
Figure 20 Organization Software Development Methodologies	44
Figure 21 Rules for Out-of-Control Points	47
Figure 22 Similarity Matrixes for Inputs – Case Study A	48
Figure 23 Similarity Matrixes for Outputs – Case Study A	49
Figure 24 Similarity Matrixes for Activities – Case Study A	49
Figure 25 Similarity Matrixes for Roles – Case Study A	49
Figure 26 Similarity Matrixes for Tools & Techniques – Case Study A	50
Figure 27 Base Process Clusters for System Test Process	50
Figure 28 Process Clusters Report	51
Figure 29 Process Cluster Distances & Process Attributes	51
Figure 30 Process Cluster Distances & Process Attributes	51
Figure 31 Process Cluster Distances & Process Attributes	52

Figure 32 Metric Usability Questionnaire and Rating for Number of Test Cases
Defined53
Figure 33 Metric Usability Report for Node Coverage Process
Figure 34 Metric Data of Case Study A
Figure 35 Individuals Charts for Derived Metrics of Test Defect Density for Node
Coverage
Figure 36 Individuals Charts for Derived Metrics of Test Effectiveness for Node
Coverage
Figure 37 Individuals Charts for Derived Metrics of Test Speed for Node
Coverage
Figure 38 Process Similarity Matrixes for Inputs – Case Study B58
Figure 39 Process Similarity Matrixes for Outputs – Case Study B
Figure 40 Process Similarity Matrixes for Activities – Case Study B
Figure 41 Process Similarity Matrixes for Roles – Case Study B
Figure 42 Process Similarity Matrixes for Tools and Techniques – Case Study B60
Figure 43 Base Process Clusters for System Test Process – Case Study B60
Figure 44 Process Clusters Report – Case Study B60
Figure 45 Process Cluster Distances & Process Attributes61
Figure 46 Process Cluster Distances & Process Attributes61
Figure 47 Process Cluster Distances & Process Attributes61
Figure 48 Metric Usability Questionnaire and Rating for Total Number of Test Cases
Defined for System Testing Process63
Figure 49 Metric Usability Evaluation Report – Case Study B64
Figure 50 Metric Data of Case Study B64
Figure 51 Individuals Charts for Derived Metrics of Test Defect Density for Path
Coverage
Figure 52 Individuals Charts for Derived Metrics of Test Effectiveness for Path
Coverage
Figure 53 Individuals Charts for Derived Metrics of Test Speed for Path Coverage67

LIST OF ABBREVIATIONS

CMMI	Capability Maturity Model Integrated
GG	Generic Goal
GP	Generic Practice
GQM	Goal-Question-Metric
L2	Maturity Level 2
L3	Maturity Level 3
L4	Maturity Level 4
L5	Maturity Level 5
LCL	Lower Control Limit
MUQ	Metric Usability Questionnaire
OCP	Out-of-Control Point
PEQ	Process Execution Questionnaire
QPM	Quantitative Process Management
SEI	Software Engineering Institute
SG	Specific Goal
SP	Specific Practice
SPC	Statistical Process Control
SPC-AM	Assessment Model for Statistical Process Control
SQM	Software Quality Management
SRS	Software Requirements Specification
SW	Software
UCL	Upper Control Limit
V&V	Verification and Validation
CV	Coefficient of Variation

1 INTRODUCTION

Collecting right metrics and analyzing them in a proper manner provides improving quality and making software processes more efficient while designing and implementing software. Besides the results of the analysis done being a indicator for defining processes correctly or implementing them, it can also be a indicator for the correctness of the methods that are being used for these processes' applications.

Statistical Process Control (SPC) is a statistical based approach that enables us to determine whether a process is stable or not by discriminating between the presence of common cause variation and assignable cause variation. It is a well-established technique, which has shown to be effective in manufacturing processes but not yet in software process contexts [1, 2].

Verification and validation (V&V) process which is one of the most applicable processes for statistical methods is a continuing process throughout the development. Software inspection and software test are the two methods used to verify and validate the software during the development [3].

Software testing has been defined as the process of executing software and comparing the observed behaviour with the desired behavior. The major goal of software testing is to discover errors in the software, with a secondary goal of building confidence in the proper operation of the software when testing does not discover errors [4]. Testing activities have to start at the requirements specification stage, with planning of test strategies and procedures. Data obtained from a real project were analyzed using the framework for validation.

Measurement itself is not a goal, but the goal is to improve the processes. How to measure a test process is a required capability for an effective software testing process. This implies continuous process monitoring in order to predict its behaviour, highlight its performance variations and, if necessary, quickly react to it.

Florac/Carleton explains the different steps, especially in the data collection and behavior description, using statistics in the process measurement [5]. W. Steven Demmy's study shows that SPC techniques can be used to improve the quality and productivity of large-scale software development. He discusses the advantages and

disadvantages of software SPC [6]. Manfred Widera's study shows that even the simplest data flow oriented criterion contains significantly more information than node coverage [7]. In the literature, there are number of articles that discuss the suggestions on implementation of SPC for process improvement in software. These studies indicate that almost all characteristics of processes and products display variation when they are measured.

It is indicated that software process data often represent multiple sources that need to be treated separately, and discovering multiple sources requires the careful investigation of process executions. Clustering is a technique used to analyze or divide a universe of data into homogeneous groups. If the executions of a process show similarity in terms of these attributes, it will be assumed that process executions form a homogeneous subgroup (or "cluster") which consistently performs among its executions; and the process cluster is subject to using SPC techniques.

In this study, two case studies were implemented at a project-based working software organization which had achieved Level 3 in the Software-Capability Maturity Model Integrated (SW-CMMI). The project used here is a large data entry and query system developed on networked, client/server, server utilizing Java and IBM DB2. The project was developed during 6 months with a staff of 5 with approximately 8,000 lines of code.

Two different testing techniques (path and node coverage) were applied on the defined test cases of the project, and statistical methods were implemented to compare these two techniques on prospectivelly collected test case data. While implementing the statistical methods, an assessment model (SPC-AM) which supports process clustering and metric usability evalulation and its tool (SPC-AAT) were used. By this study; it was aimed to understand the use of measurements defined for the system test, and to identify which test coverage technique would be useful for the validation process by evaluating the effectiveness of two black-box test coverage techniques.

The main quantitative tool used in this study was SPC by utilizing control charts. The project analyzed lifecycle data collected during development for testing. Defects were collected during this life-cycle and were quantitatively analyzed using

statistical methods. As a result; metric data for the two test coverage techniques were evaluated and suggestions were proposed on the effectiveness.

1.1 Overview

This chapter gives an overview of this thesis.

Chapter 2 gives basic knowledge on software processes like Validation, CMMI approach, software measurement and SPC. It introduces important terms and concepts that are used in the following chapters.

Chapter 3 provides a survey of the literature on test coverage and SPC implementations for software.

Chapter 4 provides the details related to the assessment model and the assessment process. It describes basic components of the model and explains the assets developed for use in the assessment.

Chapter 5 contains the application part of this study. It gives detailed flow of the case studies.

Chapter 6 discusses results of the implemented test coverage methods which software measures are useful for validation process. In this chapter this study is summarized and the result and experiences from the thesis are discussed.

2 BACKGROUND

2.1 Software Test Process

The software engineering process is a set of sequential practices that are functionally coherent and reusable for software engineering organization implementation and management. It is usually referred to as the software process or simply the process [8].

A software process is structured approach that describes the different activities that will lead to a developed product. Software processes are complex and no two projects are completely the same hence there is not one process that is applicable in all cases. Many organizations use tailoring (modifying process elements and changing the workflow) to develop organization and project specific processes. It is not uncommon for a project to use different processes for different components of a product [9]. There are a number of generic process models, for example the waterfall model, evolutionary development, formal systems development and re-use development [10].

The fundamental activities are the same in all processes: specification, design and implementation, validation. The specification of the software is critical for the further development, because a mistake here will lead to difficulties in the design and implementation. The specification of the software should define its functionality and constraints. This activity is also known as requirements engineering.

The implementation activity is to design and program according to the specification, and it will result in an executable system. If the development process is evolutionary, the specification may also be changed. During the design, the designers decide the structure of the software, the interfaces, the components, and sometimes also the data structures and algorithms. The later part of the design is interleaved with the implementation, and that is why design and implementation is stated as one activity. Some software projects put little effort on design, and instead start to implement almost immediately. This approach is not to recommend, because the lack of structure may create a software that is hard to maintain. There are no general implementation guidelines to follow, but all programmers develop

their own style. The programmers do not only program, but they do also some testing and debugging. Testing is to discover failures, and debugging is to find and correct the place in the code that caused it [9].

Software validation is an activity to make sure that the system meets the specification and the expectations from the end user (Figure 1). After the implementation, different modules of the system work independently, and the next step is to test the modules together. After this test, it is time to test the whole system. The system test includes to validate the functional- and non-functional requirements, and to test the most important properties.

The final step in the validation process is the acceptance test. This means to test the system with data from the end user instead of simulated data. The acceptance test will reveal whether it meets the requirements, and if the performance is acceptable [11].



Figure 1 The Software Testing Stages

2.1.1 Verification and Validation (V&V)

Verification and validation are most times used in the same context, but it is important to remember that they have a different meaning given in the following definition [3]:

- "Validation: The right product is being built?"
- "Verification: The product is being built right?"

In other words verification is to make sure that the product meets its specified functional and non-functional requirements. Validation is to make sure that the product is functioning the way that the end user wants. The objective with verification and validation is not to make the system completely defect free, but to make it good enough for its intended use. V&V process which consists of inspection, review, audit and test subprocesses (Figure 2) is a continuing process throughout the development. Software inspection and software test are the two methods used to verify and validate the software during the development. Software inspection does not require an executable program and can therefore be used throughout the whole development. Software testing does on the other hand require an executable program and can only be used in the later stages. Testing is something that is inevitable in all software development.



Figure 2 Verification and Validation Process

2.1.2 Testing Methods

In testing there are two different approaches when looking at the code. Static testing is done without executing the code. Instead one goes through the code manually to find faults. Dynamic testing is done by actually executing the code and looking for faults [12].

One method for dynamic testing is black-box testing. Black-box tests the specification without any knowledge of the implementation. This means that the only criterion for success in the testing is if the result is what it should be according to the requirement specifications. The input is chosen very carefully to get the desired result. For each demand a test is designed and the output is compared with the expected one. If there are no discrepancies then the product is considered to be correct.

Various flaws can arise when using this method. There is no way to be sure that all of the code is executed and that all of the cases in the code really is tested. This

means that faults can arise at a later stage when the same demand is tried but under different conditions.

Black-box testing is a very simple approach from the tester's point of view. All they have to do is study the specification and write tests to check that every demand is fulfilled. They can concentrate completely on the functional demands and therefore this approach is also sometimes called functional testing. When discrepancies are found, this method is often much more comfortable for the tester than for the developer. When writing fault reports using this method it is often not really known what caused the fault but rather only that there was a fault. This makes revising more difficult as the developer in a greater extent have to search for the fault in a much wider part of the product, especially if the fault occurs late in the developing process.

Black-box testing is perfect for checking a thorough specification to ensure that the end user's demands are fulfilled. But the method is much better on confirming that the demands in the specification is fulfilled than finding all faults due to the difficulty in deciding on input values. The method is fairly easy for the testers as they do not have to read the developer's code but on the other hand the revising could take longer as it can be difficult to decide where the fault occurred.

Many coverage criteria for software testing such as statement and path coverage, treat each statement as a single node. The testing techniques considered in this study are classified in the literature as black-box, because to generate the test cases for these techniques, a thorough understanding of the source-code of the programs are not needed. The following two test coverage techniques were studied:

• Node Coverage requires the execution of each processing node was executed.



Figure 3 Basic Node Testing Model Representation

Path coverage requires the execution of all possible paths, for instance; branches, statements, and other paths in a program (Figure 3). Faults may not be discovered if the parts containing them have not been executed. The paths should have distinct branches from the start to end of a control flow graph of a program. Thus, essentially, thorough testing is possible through this technique. But, in practice, the number of such paths can be too large in large programs.



Figure 4 Basic Path Testing Model Representation

Similar to node based models, the path based models consider software architecture with components and interfaces. Initially the different paths in system are obtained either experimentally or algorithmically. Path reliability is the product of all component reliabilities along the path. The system reliability is average of all the path reliabilities. Node based models analytically account for the infinite loops in a path but path based models terminate the loop to one or to an average execution time of the path. Mathur developed a method to combine architecture and failure process by estimating the path reliabilities based on the sequence of components executed for a single test run and the average over all test runs to obtain the system reliability [13].

2.1.2.1 System Testing

System testing is testing that is conducted on the complete, integrated system to evaluate the system's compliance with its requirements. System testing is generally based on black-box testing techniques. In black-box testing the internal workings of the test object are not known and the tester focuses mostly on how the system reacts to different inputs. This is opposed to white-box testing which studies and tests different parts of the system, in detail. System testing tends to be more of an investigatory testing phase, where testers tend to have an almost destructive attitude and not only test the design, but also the behaviour and the believed expectations of the end user. System testing is intended to test up to and beyond the software and hardware requirements specifications. As software faults are found during system testing new software builds are released that include corrections of detected faults. The incremental nature of system testing is controlled by defining regression tests.

2.2 Software Process Management

Software process management is about successfully managing the work processes associated with developing, maintaining, and supporting software products and software intensive systems [11]. Successful management is that the products and services produced meet the business objectives of the organization responsible for producing the products. The concept of process management is found on the principles of statistical process control. These principles hold that by establishing and sustaining stable levels of variability, processes will yield predictable results. We can then say that the processes are under control statistically.

Predictable results should not be interpreted to mean identical results. Results always vary; but when a process is under statistical control, they will vary within predictable limits. If the results of a process vary unexpectedly—whether randomly or systematically—the process is not under control, and some of the observed results will have assignable causes. These causes must be identified and corrected before stability and predictability can be achieved. Controlled processes are stable processes, and stable processes enable us to predict the results. This in turn enables us to prepare achievable plans, meet cost estimates and scheduling

commitments, and deliver required product functionality and quality with acceptable and reasonable consistency. If a controlled process is not capable of meeting end user requirements or other business objectives, the process must be improved or retargeted (Figure 4).



Figure 5 Steps for Using Control Charts to Evaluate Process Stability [14]

At the individual level then, the objective of software process management is to ensure that the processes you operate or supervise are predictable, meet end user needs, and (where appropriate) are continually being improved. From the larger, organizational perspective, the objective of process management is to ensure that the same holds true for every process within the organization.

There are four key responsibilities of software process management which are *define the process, measure the process, control the process, improve the process.* The flow between these processes are shown in Figure 5 [11, 14].



Figure 6 The Four Key Responsibilities of Process Management

2.2.1 The CMMI Approach

CMMI stands for Capability Maturity Model Integration [16] and it is a process improvement approach that provides organizations with the essential elements of effective processes. It can be used to guide process improvement across a project, a division, or an entire organization. CMMI helps integrate traditionally separate organizational functions, set process improvement goals and priorities, provide guidance for quality processes, and provide a point of reference for appraising current processes.



Figure 7 Capability Maturity Model Integration (CMMI)

The CMMI is a model that needs to be interpreted based upon the business environment and technical needs of the project; it is not a standard that must be implemented exactly as documented.

The CMMI is structured in the five maturity levels (Figure 7), the considered process areas, the specific goals (SG) and generic goals (GG), the common features and the specific practices (SP) and generic practices (GP) are given in Figure 8. The process areas are defined as follows:

"The Process Area is a group of practices or activities performed collectively to achieve a specific objective."



Figure 8 The CMMI model components

Such objectives could be the part of requirements management at the level 2, the requirements development at the maturity level 3 or the quantitative project management at the level 4.

CMMI based process improvement benefits include;

- Improved schedule and budget predictability
- Improved cycle time
- Increased productivity
- Improved quality (as measured by defects)

- Increased end user satisfaction
- Improved employee moral
- Increased return on investment
- Decreased cost of quality

2.2.1.1 CMMI Process Maturity Levels

Initial (Level 1): The initial environment has ill-defined procedures and controls. The organization does not consistently apply software engineering management to the process, nor does it use modern tools and technology. Level 1 organizations may have serious cost and schedule problems.

Repeatable (Level 2): At L2, the organization has generally learned to manage costs and schedules, and the process is now repeatable. The organization uses standard methods and practices for managing software development activities such as cost estimating, scheduling, requirements changes, code changes, and status reviews.

Defined (Level 3): At L3, the process is well-characterized and reasonably well understood. The organization defines its process in terms of software engineering standards and methods, and it has made a series of organizational and methodological improvements. These specifically include design and code reviews, training programs for programmers and review leaders, and increased organizational focus on software engineering. A major improvement in this phase is the establishment and staffing of a software engineering process group that focuses on the software engineering process and the adequacy with which it is implemented.

Managed (Level 4): At L4, the process is not only understood but it is quantified, measured, and reasonably well controlled. The organization typically bases its operating decisions on quantitative process data and conducts extensive analyses of the data gathered during software engineering reviews and tests. Tools are used increasingly to control and manage the design process as well as to support data

gathering and analysis. The organization is learning to project expected errors with reasonable accuracy.

Optimized (Level 5): At L5, the organization has not only achieved a high degree of control over its process, it has a major focus on improving and optimizing its operation. This includes more sophisticated analyses of the error and cost data gathered during the process as well as the introduction of comprehensive error cause analysis and prevention studies. The data on the process are used iteratively to improve the process and achieve optimum performance.

The Software Engineering Institute's Software Capability Maturity Model (SW-CMMI) L4 quantitative analysis leads to SW-CMMI L5 activities. L4 Software Quality Management (SQM) key process area analysis, which focuses on product quality, feeds the activities required to comply with defect prevention (DP) at L5 [1]. Quantitative Process Management (QPM) at L4 focuses on the process that leads to technology change management and process change management at L5. At L3, metrics are collected, analyzed, and used to status development and to make corrections to development efforts, as necessary. At L4, measurements are quantitative understanding of the quality of products to achieve specific quality goals. This study presents the application of statistical process control (SPC) to accomplish the SQM and QPM and apply these results to DP. Real project results are used to demonstrate the use of SPC as applied to software development. An overview of control charts is presented along with L4 quality goals and plans to meet these goals.

An organization performing L4 quantitative analysis recognizes that it leads to L5 activities. This study presents this progressive relationship in project examples where statistical process control (SPC) is used to analyze measurements. Results of this analysis are used to gain a quantitative understanding of process capability, manage progress toward achieving quality goals, and for defect prevention.

Rigorous statistics have been used in manufacturing but have had limited use in software development. The SEI's Capability Maturity Model IntegratedSM (CMMI) calls for rigorous statistics at L4 and emphasizes SPC. This study shows that

control charts and other statistical methods can easily and effectively be applied in a software setting [17].

2.3 Software Measurement

Measurement in software engineering is called software metrics, or more precise software metrics are any type of measurement that relates to a software system, process or its documentation. Software measurement is the objective quantification of attributes of software entities: processes, products and resources [18]. Software measurement is needed to gain control over excessive cost of software, low productivity, and poor quality.

Measurement is a mean to acquire quantitative information of software processes and products for the purpose of managing them. Measurement can be used to define the status of processes or product quality, to analyze the effects of changes, or o follow-up the progression of improvement actions. The main reason for measuring a software project is to get information about it and the organization, and be able to control the projects better. Software measurement can help to keep the people informed about their concerns, but it does not claim to give any absolute solutions.

Analysis and interpretation of measurement data must be done within the context of other information about the process or product. Measurement data by themselves are neither bad news nor good news. A report indicating zero defects in the two months following product release may be very good news (if the product is being used by a large number of end users) or very bad news (if there are few to zero end users using the product). Measurement results must be examined in the context of other information about the product or process to determine whether action is required and what action to take. Unexpected measurement results generally require additional information to properly assess the meaning of the measurement [11].

In order to understand what must be measured, organizational goals must be understood. If one of the organizational goals is to improve product quality, then the test process document must define metrics that allow evaluating improvements in

software quality. Test Metric is a standard means of measuring some attribute of the software testing process. . They are a means of establishing test progress against the test schedule and may be an indicator of expected future results. Pusala introduces test metrics in two forms, Base Metrics and Derived Metrics, as listed below [12].

- Example of Base Metrics:
- # Test Cases
- # New Test Cases
- # Test Cases Executed
- # Test Cases Unexecuted
- # Test Cases Re-executed
- # Passes
- # Fails
- # Test Cases Under Investigation
- # Test Cases Blocked
- # 1st Run Fails
- **Test Case Execution Time**
- # Testers

Example of Derived Metrics:% Test Cases Complete

- % Test Cases Passed
- % Test Cases Failed
- % Test Cases Blocked
- % Test Defects Corrected

2.3.1 Software Process Measurement

Controlling a process means making it behave the way we want it to. This provides two things for organization: predict results and produce products that have characteristics required by the end users. With control, we can commit to dates when products will be delivered and live up to such commitments.

There are five perspectives that are central to process measurement [11]:

- Performance
- Stability
- Compliance
- Capability
- Improvement and investment

2.3.2 Why Measure?

There are four reasons for measuring software processes, products, and resources [11]:

• To characterize

They are characterized to gain understanding of processes, products, resources, and environments, and to establish baselines for comparisons with future assessments.

To evaluate

They are evaluated to determine status with respect to plans. Measures are the sensors that let us know when our projects and processes are drifting off track, so that we can bring them back under control. We also evaluate to assess achievement of quality goals and to assess the impacts of technology and processes improvements on products and processes.

• To predict

They are predicted so that we can plan. Measuring for prediction involves gaining understandings of relationships among processes and products and building models of these relationships, so that the values we observe for some attributes can be used to predict others. We do this because we want to establish achievable goals for cost, schedule, and quality—so that appropriate resources can be applied. Predictive measures are also the basis for extrapolating trends, so estimates for cost, time, and quality can be updated based on current evidence. Projections and

estimates based on historical data also help us analyze risks and make design/cost tradeoffs.

• To improve

They are measured to improve when we gather quantitative information to help us identify roadblocks, root causes, inefficiencies, and other opportunities for improving product quality and process performance. Measures also help us plan and track improvement efforts. Measures of current performance give us baselines to compare against, so that we can judge whether or not our improvement actions are working as intended and what the side effects may be. Good measures also help us communicate goals and convey reasons for improving. This helps engage and focus the support of those who work within our processes to make them successful.

2.3.3 Measurement Scales And Scale Types

Measurement Scales [20];

Ratio: Numeric data with equal distances corresponding to equal quantities of the attribute.

Interval: Numeric data with equal distances corresponding to equal quantities of the attribute.

Ordinal: Observations result in assigning discrete rankings.

Nominal: Observations result in assigning a category or class.

Scale Types;

Discrete or event (attribute):

- Counted and plotted as discrete values
- Possible values are finite over any given interval

Continuous (variable):

• Measured and plotted on a continuous scale

- Can assume all values between any two given values
- Effectively, infinite number of values is possible

Large (discrete) counts may be treated as continuous for many purposes.

2.3.4 Why do we need metrics?

A major percentage of software projects suffer from quality problems. Software testing provides visibility into product and process quality. Test metrics are key "facts" that project managers can use to understand their current position and to prioritize their activities to reduce the risk of schedule over-runs on software releases.

Test metrics help us to measure our current performance. Because today's data becomes tomorrow's historical data, it is ever too late to start recording key information on your project. This data can be used to improve future work estimates and quality levels. Without historical data estimates will just be guesses.

The benefits of having good metrics;

- Test metrics data collection helps predict the long term direction and scope for an organization and enables a more holistic view of business and identifies highlevel goals.
- Provides a basis for estimation and facilitates planning for closure of the performance gap.
- Provides a means for control/status reporting.
- Identifies risk areas that require more testing.
- Quickly identifies and helps resolve potential problems and identifies areas of improvement.
- Test metrics provide an objective measure of the effectiveness and efficiency of testing.

2.3.5 The Goal/Question/Metric Method (GQM)

The GQM method represents a systematic top-down approach to defining and collecting measurements, and on the other hand, a bottom-top approach when analyzing data against stated measurement goals. One of the method's main aims to establish a visible link from measurement goals to the data collected. The underlying idea is to avoid the high risk of wasting resources when measurement data is collected without an idea of its usage. GQM adapts and integrates organizational objactives into measurement goals, and refines them into measureable attributes on a step-by-step basis; therefore, GQM helps to identify the exact metrics necessary for meeting case-specific objectives.



Figure 9 The activities of a GQM measurement programme [9]

A GQM model is a hierarchical structure as shown in Figure 9. It starts with a goal specifying purpose of the measurement, object to be measured, issue to be measured, and viewpoint from which the measure is taken. Objects of measurement include products, processes, and resources. The goal is refined into several questions that usually break down the issue into its major components. Questions try to characterize the object of measurement (product, process, or resource) with respect to a selected quality issue, and to determine its quality from the selected viewpoint. Each question is then refined into metrics, either object that is being measured and not on the viewpoint from which they are taken. Subjective metrics depend on both the object that is being measured and the viewpoint from which they are taken. The same metric can be used to answer different questions under the same goal. Several GQM models can have questions and metrics in common.

The goal-driven measurement process is based on 3 precepts, and it consists of 10 steps [20, 21].

The three precepts are;

- Measurement goals are derived from business goals.
- Evolving mental models provide context and focus.
- GQ(I)M1 translates informal goals into executable measurement structures.

The 10 steps are;

- 1. Identify your business goals.
- 2. Identify what you want to know or learn.
- 3. Identify your subgoals.
- 4. Identify the entities and attributes related to your subgoals.
- 5. Formalize your measurement goals.
- 6. Identify quantifiable questions and the related indicators that you will use to

help you achieve your measurement goals.

7. Identify the data elements that you will collect to construct the indicators

that help answer your questions.

- 8. Define the measures to be used, and make these definitions operational.
- 9. Identify the actions that you will take to implement the measures.
- 10. Prepare a plan for implementing the measures.

GQM is currently the best approach and it has been successfully used in many software organizations. But due to its shortcomings researches have proposed a number of improved GQM approaches. One of them is V-GQM that is described below. Olsson and Runeson [20] present an extended GQM, which they call V-GQM (Validation Goal Question Metric). The purpose of the V-GQM is to take unforeseen benefits of the metrics into account and to improve subsequent GQM studies. When the original GQM stops after the analysis of the gathered data, V-

GQM has three additional steps, which are metric validation, question analysis, and goal refinement as indicated in Figure 9.



Figure 10 The V-GQM Model

First Step: Goal Definition

Analyze	The system test process
For the purpose of	improving
With respect to	efficiency
From the viewpoint of	the system tester
In the context of	product XXXXX

Second Step: Defining Questions

Q1. Which is the most effective test technique?

Third Step: Identify Metrics

M1. Test Effectiveness

By creating goals, questions and linking them to metrics, data extraction will be made in a more structured way: each metric will have a clearly defined purpose and a traceable dependency to the defined goals. This facilitates making analyses on the collected data and helps drawing conclusions on improvement suggestions.

2.4 SPC

Statistical process control (SPC) involves using statistical techniques to measure and analyze the variation in processes [22]. The intent of SPC is to monitor product quality and maintain processes to fixed targets. Statistical quality control refers to using statistical techniques for measuring and improving the quality of processes and includes SPC in addition to other techniques, such as sampling plans, experimental design, variance reduction, process capability analysis, and process improvement plans.

SPC is used to monitor the consistency of processes used to generate a product as designed. It aims to get and keep processes under control. No matter how good or bad the design, SPC can ensure that the product is being generated as designed and intended. Thus, SPC will not improve a poorly designed product's reliability, but can be used to maintain the consistency of how the product is made and, therefore, of the generated product itself and its as-designed reliability.

A primary tool used for SPC is the control chart, a graphical representation of certain descriptive statistics for specific quantitative measurements of the processes. These descriptive statistics are displayed in the control chart in comparison to their "in-control" sampling distributions. The comparison detects any unusual variation in the process, which could indicate a problem with the process. Several different descriptive statistics can be used in control charts and there are several different types of control charts that can test for different causes, such as how quickly major vs. minor shifts in process means are detected. Control charts are also used with product measurements to analyze process capability and for continuous process improvement efforts.
There is an increased interest in using control charts for monitoring and improving software processes, particularly quality control processes like reviews and testing. In a control chart, control limits are established for some attributes and, if any point falls outside the limits, it is assumed to be due to some special causes that need to be identified and eliminated. If the control limits are too tight, they may raise too many false alarms and, if they are too wide, they may miss some special situations [22].

Control Chart (Figure 11): Control charts are simple statistical analysis tools, which include upper and lower limits to detect any outliers. They look like run charts, but with the control limits and center line. They are frequently used in SPC analyses and described in detail in the following section.



Figure 11 Control Chart Example

The application of SPC by Florac and Carleton [21] is based on the following general characterization of software process management:

Define the process as,

- Design processes that can meet or support business and technical objectives
- Identify and define the issues, models, and measures that relate to the performance of the processes

Measuring the process as,

- Collect data that measure the performance of each process
- Analyze the performance of each process
- Retain and use the data as follows: to assess process stability and capability, to interpret the results of observations and analyses, to predict future costs and performance, to provide baselines an benchmarks, to plot trends, to identify opportunities for improvement

Controlling the process as,

- Determine whether or not the process is under control (is stable with respect to the inherent variability of measured performance)
- Identify performance variations that are caused by process anomalies (assignable causes)
- Eliminate the sources of assignable causes so as to stabilize the process

Improve the process as,

- Understand the characteristics of existing processes and the factors that affect process capability
- Plan, justify, and implement actions that modify the processes so as to better meet business needs
- Assess the impacts and benefits gained, and compare these to the costs of changes made to the processes

The Florac/Carleton approach [24] is addressed to the beginning of process measurement and explains the different steps using statistics in the process measurement, data collection and behaviour description especially.



Figure 12 Florac/Carleton Approach for Process Measurement [24]

There are several methods for performing SPC: Scatter diagrams, run charts, cause and effect diagrams, histograms, bar charts, pareto charts, and control charts. Although all of these methods are useful, we will focus this study on control charts.

SPC control charts, if successfully applied, can be a significant impetus for software process improvement. By knowing our normal process, we can reengineer it to obtain improvement in some performance aspect. And, by identifying anomalous behavior, we can seek the special cause (an influence from outside the system) and take action to prevent it from affecting future performance.

The fundamental idea of process improvement is that as the system is observed over time, the process decreases its variation and, increasingly, gets closer to achieving its planned performance objective because of the introduction of improvements. SPC control charts facilitate this process improvement concept. Thus, you have the reason why the recently issued Software CMM Integration (CMMI) has specifically used the words "statistically manage" in its CMMI L4 Process Area, "Quantitative Project Management" [17].

There are seven SPC control chart types, each having a specific application. The control chart required for our application is termed "Individuals and Moving Range." Symbolically, it is shown as XmR, where X represents the individual observations, and mR represents the moving range, the difference between successive observations. The XmR control chart is used when there is only one measurement of the variable in an observation period.

For all types of control charts, the control limits establish filtering. The high limit is plus three sigma from the average of the observations, whereas the low limit is the average minus three sigma. Sigma is a standard statistical measure of the variation in the process [25].

3 LITERATURE REVIEW

Coverage Measurement Experience During Function Test [26];

Piwowarski, Ohba, Caruso discussed that measurement of statement and branch coverage of large system software can be done, and is cost effective in removing errors and if a good test coverage measurement tool is available, an exit criteria of unit test can be 100% statement coverage.

Improving State-Based Coverage Criteria Using Data Flow Information [27];

Briand, Labiche, Lin show that data flow information can be used to select the best transition tree when more than one satisfies the transition tree criterion. They further propose a more optimal strategy for the transition tree criterion, in terms of cost and effectiveness. The improved tree strategy is evaluated through the two case studies and the results suggest that it is a cost-effective strategy that would fit into many practical situations.

Measurement Issues and Software Testing [28];

Cem Kaner worked on measurement issues to identify the methods used in software testing.

Data Flow Coverage for Testing Erlang Programs [7];

Manfred Widera's study concludes that while the proposed data flow oriented coverage criteria are more complex to check than simple node coverage (especially they rely on the computation of a flow graph), measurements show that even the simplest data flow oriented criterion contains significantly more information than node coverage.

Statistical Process Control: Measuring the Software Process – Statistical Process Conrol for Software Process Improvement [24];

The Florac/Carleton approach is addressed to the beginning of process measurement and explains the different steps using statistics in the process measurement, data collection and behaviour description especially.

28

Define the processes; design processes that can meet or support business and technical objectives and identify the issues, models, and measures that relate to the performance of the processes.

Measure the processes; collect data that measure the performance of each process and analyze the performance of each process.

Control the processes; determine whether or not the process is under control (is stable with respect to the inherent variability of measured performance) and identify performance variations that are caused by process anomalies (assignable causes). Control the processes by eliminating the sources of assignable causes.

Improve the processes; understand the characteristics of existing processes and the factors that affect process capability. Plan, justify, and implement actions that modify the processes so as to better meet business needs. Assess the impacts and benefits gained, and compare these to the costs of changes made to the processes.

Statistical Process Control in Software Quality Assurance

W. Steven Demmy's study [6] shows may SPC techniques be used to improve the quality and productivity of large-scale software development. He concludes with the advantages and disadvantages of Software SPC. Process monitoring has two major advantages compared to the detailed inspection of completed software units. First, errors may be detected earlier or prevented altogether. Second, less effort may be required to Successful applications insure that processes are operating discipline. They require correctly than is required to perform detailed checks on all the outputs of that process. Thus, higher quality may be achieved at a lower development expense. Despite the advantages listed above, there are several potential disadvantages. Successful applications require an organizational climate that rewards the detection and correction of problems. Once formal process monitoring has been implemented, failures in discipline, in planning, or in commitment will be quickly visible. If the organizational climate views problem detection as a means of assigning blame, rather than of solving problems, attempts to support of the system will be replaced by attempts at system subversion.

The Florac/Carleton approach [24] is addressed to the beginning of process measurement and explains the different steps using statistics in the process measurement, data collection and behaviour description especially.

Niessink and Vliet [29] worked on measurement-based improvement which is that measurement itself is not a goal, but the goal is organisational, or to solve an organisational problem. It is assumed that the measurement activities are performed in combination with improvement activities to reach the goal. The process starts at the leftmost dot with an organisational problem or a goal. The organisation analysis the problem and arrive in the middle, with either a solution or a cause to the problem. If they have enough information to solve the problem they implement it and arrive at the goal (leftmost dot). If they have not enough information they need to implement a measurement program or design an experiment (right dot). Analysing the gathered information takes the organisation back to the middle with a solution. They then implement the solution and arrive at the goal (left dot). This model is very simplified and it might be that the organisation has to loop the right part many times to find a solution.

4 AN ASSESMENT MODEL FOR STATISTICAL PROCESS CONTROL

The assessment approach includes an assessment process that guides the evaluation, an assessment model that defines assets to evaluate a process and metrics, and an assessment tool that supports this evaluation [30].

The assessment model aims to test the suitability of a software process and metrics for quantitative analyses. It investigates two basic requirements for quantitative implementation: Stratification of process executions and data, and metric and data utilization for statistical analyses [30, 31].

The assessment model was previously utilized on eight case studies in several industrial contexts. The assessments were performed retrospectively on past process executions and data in all case studies. The assessments were performed by individuals who are software experts. Process performers were the basic information source while trying to capture contextual information of past process executions.

4.1 Model Components

The first requirement is the stratification of process executions and data. The purpose of stratification is to obtain and use data that are representative of the performance of the process with respect to the issues being studied. If it can be considered that observations are made under essentially the same conditions and that differences between the measurements are primarily due to common cause variation, then the observations are very likely grouped rationally.

Since the sampled process executions as being from a single and constant system of chance causes, a clustering method was developed based on process attributes such as inputs, outputs, activities, roles, and tools and techniques. The relation of these attributes to the process is given in Figure 13. If repetitions of a process show similarity in terms of these attributes, then it is assumed that the process is consistently performed among its executions. Process attributes are briefly described below: Input: An entity that have been entered into the process or expended in its operation to achieve one or more outputs. The process has a number of inputs to each execution.

Output: An entity that have been produced by the process or created in its operation to satisfy process purpose. The process has a number of outputs from each execution.

Activity: A distinct step within the process, when completed, supports transformation of input(s) into output(s) to achieve process purpose. The process has a number of activities that are carried out within each execution.

Role: The actions assigned to or required of a person or group to carry out the activities within the process. The process allocates responsibility to a number of roles that participates in one or more process activities.

Tools and Techniques: An implement used in or a practical method applied to some particular activity to support its completion. The process holds a number of tools and techniques that are used in one or more process activities.



Figure 13 Process Attributes used for Stratification

Process consistency is assessed for similarity in process attribute values of process executions. The attribute values were recorded of each execution on a form, and to compare the similarity of these recorded values on a matrix. Ideally it is desirable that the process has a unique version in execution. The idea behind process consistency assessment as basis for stratification is to identify, if any, these differing versions of a process in execution.

The second requirement is metric utilization. This includes elaboration of basic measurement practices as well as metric data existence and characteristics. Measurement practices should be performed for a specific purpose and, metrics should be uniquely understood to enable consistent implementation. Unique understanding (mostly enabled by constructing operational definitions) requires three criteria: communication, repeatability, and traceability. The traceability requirement is especially important to assessing and improving process performance. Because measures of performance can signal process instabilities, it is important that the context and circumstances of the measurement be recorded. This helps identifying assignable causes of the instabilities. There are studies that define procedures for successfully implementing measurement practices and for incorporating measurement capability into the projects of an organization. The CMMI for example, introduces Measurement and Analysis process area at maturity level 2, and recommends practices for defining data collection, storage, analysis, and reporting. Existence and implementation of these practices can be questioned for a specific project or organization to determine the utilization of existing metrics and data. Also, there are high-maturity companies that developed the factors to consider for measurement evaluation and to determine what measures to select for their specific use.

To evaluate metric utilization, a number of metric usability attributes were identified, and developed questionnaires based on these attributes for base and derived metrics separately. Table 1 lists and explains these attributes. Questionnaires include a rating system based on the answers of questions, and accordingly, evaluate the usability of a specific metric for applying SPC. A metric must satisfy the scale type requirement (absolute or ratio) and have enough data points to use (20 at a minimum) as specified by the first two attributes. Verifiability and dependability of metric data significantly contribute to the confidence in data analysis results. Data verifiability is related with the consistency in metric data recording and storage among executions. Data dependability requires all metric data be recorded as close to its source with accuracy and precision. The awareness of data collectors on metric data (why it is collected, how it is utilized, etc.) plays a significant role in data

33

dependability. The last two attributes, data normalizability and data integrability, are related with the usefulness of a metric and should be satisfied if we expect SPC analysis provide more insight for process understanding and improvement.

Table 1 Metric Usability Attributes used for Evaluating Metric Utilization

Metric Usability	Explanation
Attribute	
Metric Identity	Metric should be identified including entity and attribute to measure;
	identity is the scale type of the motion. Nominal and ordinal scale
	metrics cannot be used for control charting
	methos carnot be used for control charting.
Data Existence	For any analysis, there should be measurement data. For control
	limits to be calculated reliably there should be at least 20 data points.
Data Verifiability	Metric data should be recorded at the same place in the process, by
	the same responsible body, and using the same method every time.
Data	Metric data should be recorded and stored as it is generated to ensure
Dependability	accuracy and precision; and be collected for a specific purpose.
	Feedback mechanisms should exist and be known by data collectors
	regarding data analysis and reporting.
Data	Metric data can be normalized with a parameter or with another
Normalizability	metric. Normalizing metric-A with a parameter-P provides comparable
	values of metric-A in terms of the parameter-P. Normalized metrics
	provide more insight in terms of statistical analysis (e.g., normalizing
	number of defects in a product with product size).
Data	Metric data can be integrated at project or organization levels. In
Integrability	practice, metric data should be integrated from individual level up to
	organization level for the results of statistical analysis to be effective
	organization-wide.

4.2 Assessment Process

The assessment process to follow when applying the model is given in Figure 14.



Figure 14 The Assessment Process

The first step of the assessment process is reviewing and gathering process data typically in a data file. Data should be consolidated in time sequence and in a form that is appropriate for comparison among different projects and product types. During consolidation, traceability should be established between process executions and data, typically by giving the same identifier to both. The data of process executions having missing, incomplete, or invalid data points should be excluded.

The flow at the left side of the figure is for performing stratification. The values of process attributes were investigated and identified for process executions by filling

out process execution records. If the study is retrospective then several executions were sampled from past process performances and fill a record for each. A merged list of values is built from process attribute values of sampled executions on records and entered into process similarity matrix for verification against entire set of process executions. The list on the matrix is extended during verification when a new value shows up.

If the study is prospective, a process execution record is filled when a new instance of the process is being executed. This increases the confidence on the values of process attributes for a process execution. Another difference in a prospective study is that a process execution questionnaire was completed for each instance of the process in execution and at the same time a process execution record (not while searching for the assignable causes later in the process as shown in figure). This was to capture the external factors affecting the process execution more timely, and have the chance of identifying likely assignable causes in advance.

The last step of the flow at the left side of Figure 14 as basis for stratification was identifying initial process clusters and possible merges among them by analyzing the process similarity matrix.

The flow at the right side of the figure was for evaluating metric utilization. First, usability of each base metric and then usability of each derived metric is evaluated by filling a metric usability questionnaire, and calculating regarding metric usability result.

After initial process clusters were identified and usability of process metrics were evaluated, the knowledge that is gathered so far was used as well as process data to finalize process clusters and metrics as basis for control charting. This is where the flows at left and right sides join in Figure 14. Here initial process clusters and possible merges were reviewed among them, the number of data points for each process cluster, and the usability status of process metrics; and the resulting process cluster-process metric pairs to chart are identified. This model recommends charting the data for process metrics that are evaluated as "usable" for statistical analysis; however, it might be a good idea to chart the data for the metrics that are evaluated as "not usable" to validate (or invalidate) the model's recommendation. It

36

is better to review the number of data points per process metric basis since there may be missing data points.

The data was separately put for *process cluster-process metric* pairs on control charts, and watched for the out-of-control points. In a retrospective study, process execution questionnaire is filled for each out-of-control point to understand the assignable causes if any. In a prospective study, previously filled process execution questionnaires were reviewed to understand the assignable causes. Additionally, performing interviews with process performers was suggested to detect any reasons for out-of control points, or potential assignable causes that the process execution questionnaires cannot catch. After removing data points regarding the assignable causes at each chart, the data was re-charted for each *process cluster-process metric* pair and watch if the data on the chart is under control. Here is the place to judge whether approach helped in starting SPC. If a chart regarding a process cluster-process metric pair validates the findings of the assessment model, then SPC monitoring begins for that pair.

4.3 Assessment Assets

The model defines several assets exist for use in the assessment to perform stratification and to evaluate metric utilization. Process execution record together with process similarity matrix is utilized to identify process clusters as basis for stratification. Metric usability questionnaires were used to evaluate metrics' usability for SPC, and process execution questionnaire was used to investigate assignable causes for an out-of-control point on a control chart. The following paragraphs describe these assets.

Process Execution Record is a form used to capture the instant values of process attributes for a process execution. Actual values of inputs, outputs, activities, roles, and tools and techniques for a specific process execution are recorded on the form (Figure 15). Recorded values were used to identify the merged list of process attribute values which were entered into Process Similarity Matrix for verification.

37

	Process Name:					Recorded On:					
	Proc	ess Execution No:									
1.	Inputs	Please list the inputs to	the process e	ecutio	on.						
	No	Name	Descrip	Description							
	1										
								_			
2.	Outpu	ts: Please list the output	ls from the pro	cess e>	ecution.						
	No	Name	Descrip	ption							
	1										
	2							_			
з.	Activit	ties: Please list in seque	nce the activit	ies that	twere perfo	rmed while execut	ing the process.				
	No	Name	Descrip	Description							
	1										
	2										
4.	Roles	Please list the roles tha	twere allocate	ed resp	onsibilities i	n process executio	on.				
	No	Name			Descriptio	n					
	1							_			
	2										
5.	Tools	and Techniques: Pleas	e list the tools	and te-	chniques th	at are used to supp	port process execution.				
	No	Name	Descrip	ption							
	1										
	2										

Figure 15 Process Execution Record

Process Similarity Matrix is a spreadsheet used to verify process attribute values against process executions. Process attribute values were recorded into the rows of the matrix vertically and process execution numbers were recorded into the columns of the matrix horizontally. By going over process executions, the values of process attributes were questioned and marked if applicable for each process execution (Figure 16). The completed matrix helped to see the differences among process executions in terms of process attribute values, and enabled to identify stratificated samples of the process executions accordingly.

			Pro
Pro	cess I	Attributes	PE1
1	եպրո	ts	
	1.1	<input-1></input-1>	0
	1.2	<input-2></input-2>	0
2	Outp	outs	
	2.1	<output-1></output-1>	0
	2.2	<output-2></output-2>	
3	Activ	vities	
	3.1	<activity-1></activity-1>	0
	3.2	<activity-2></activity-2>	0
	3.3	<activity-3></activity-3>	0
	3.4	<activity-4></activity-4>	
- 4	Role	S	
	4.1	<role-1></role-1>	0
	4.2	<role-2></role-2>	0
5	Tool	s and Techniques	
	5.1	<tools and="" techniques-1=""></tools>	0
	5.2	<tools and="" techniques-2=""></tools>	



Metric Usability Questionnaire is a form used to investigate the usability of a process metric in terms of metric usability attributes. The form has two types, for base metrics (Figure 17a) and derived metrics (Figure 17b) separately. The form includes a number of questions as indicators of usability attributes. Answers to some questions are informative (shaded under "rating" column of MUQ in the figures) and answers to some are used to rate each usability attribute (expected answers to such questions are given in the rightmost column of MUQ in the figures). A metric usability attribute was rated as a corresponding metric usability factor (MUF) within four ordinal values, based on the answers to its indicators: Fully satisfied (F: %86-100), Largely satisfied (L: %51-85), Partially satisfied (%16-50), and Not satisfied (N: %0-15).

Me	tric Nar	me:
Co	nceptu	al Definition:
As:	essed	On:
As:	essed	By:
Att	ibutes	
	Indica	tors
Me	tric Ide	ntity
	Q1	Which entity does the metric measure?
	Q2	Which attribute of the entity does the metric measure?
	Q3	What is the scale of the metric data? (nominal, ordinal,
	Q4	What is the unit of the metric data?
	Q5	What is the type of the metric data? (integer, real, etc.
	Q6	What is the range of the metric data?
Da	ta Exist	tence
	07	Is metric data existent?
	Q8	What is the amount of overall observations?
	Q9	What is the amount of missing data points?
	Q10	Are data points missing in periods? (If yes, please stat
	Q11	Is metric data time sequenced? (If no, please state ho
Da	a Verif	iability
	Q12	When is metric data recorded in the process? (at start,
	Q13	Is all metric data recorded at the same place in the pro
	Q14	Who is responsible for recording metric data?
	Q15	Is all metric data recorded by the responsible body?
	Q16	How is metric data recorded? (on a form, report, tool, e
	Q17	Is all metric data recorded the same way? (on a form.
	Q18	Where is metric data stored? (in a file, database, etc.)
	Q19	Is all metric data stored in the same place? (in a file, d
Da	ta Depe	endability
	020	What is the frequency of generating metric data? (asv
	021	What is the frequency of recording metric data? (asyn
	022	What is the frequency of storing metric data? (asynch
	023	Are the frequencies for data generation, recording, and
	Q24	Is metric data recorded precisely?
	025	Is metric data collected for a specific purpose?
	Q26	Is the purpose of metric data collection known by proc
	027	Is metric data analyzed and reported?
	028	Is metric data analysis results communicated to proce
	029	Is metric data analysis results communicated to mana
	030	Is metric data analysis results used as a basis for dec
Da	a Norn	nalizability
F	031	Can metric data be normalized by parameters or metric
Da	ta Intec	rability
1	032	Is metric data integrable at project level?
	033	Is metric data integrable at project level?
L	1400	na meno data integrable at organization ievel?

(a) Metric Usability Questionnaire

Metric Name:		
Conceptual Definition:		
Assessed On:		
Assessed By:		
Metric Usability Attributes	Rating	Expected Rating
Metric Identity (MUA-1)	F	F
Data Existence (MUA-2)	F	F
Data Verifiability (MUA-3)	F	L or F
Data Dependability (MUA-4)	F	L or F
Metric Usability Result	F	L or F (Usable) Not Usable otherwise

(b) Metric Usability Rating

Figure 17 Metric Usability Questionnaire and Rating for Base Metrics

The values of metric usability factors were formed into a vector and evaluated to determine the metric usability result. Factor values are evaluated in the order of criticality of the attributes (1 being the most critical): 1) metric identity, 2) data existence, 3) data verifiability, and 4) data dependability. The regarding values of the vector should be at least [F, F, L, L] for a base metric to be usable (vector values of [F, F, L, P], for example, leads to a result of "not usable"). For a derived metric, vector values are evaluated together with the values of metric usability factors 3 and 4 of the base metrics should have a value of either F or L. A value of P or N for these attributes of a base metric leads to a result of "not usable" even if usability factors 3 and 4 of the base metrics for evaluation of usability of the derived metric usability factors 3 and 4 of the base metrics for evaluation of usability of the derived metric usability factors 3 and 4 of the base metrics for evaluation of usability of the derived metric usability factors 3 and 4 of the base metrics for evaluation of usability of the derived metric usability factors 3 and 4 of the base metrics for evaluation of usability of the derived metric usability factors 3 and 4 of the base metrics for evaluation of usability of the derived metric usability factors 3 and 4 of the base metrics for evaluation of usability of the derived metric usability factors 3 and 4 of the base metrics for evaluation of usability of the derived metric usability factors 3 and 4 of the base metrics for evaluation of usability of the derived metric.

			Please rate each attribute in four scales, based on asnwe	ers to que	estions as indicators:
Me	tric Na	me:	F : Indicatiors of the atribute are fully satisfied (%86-1	00)	
Co	nceptu	al Definition:	L : Indicatiors of the atribute are largely satisfied (%51	-85)	
As	sesse	d On:	P : Indicatiors of the atribute are largely satisfied (%16	6-50)	
As	sesse	i By:	N : Indicatiors of the atribute are not satisfied (%0-15)		
Att	ibute	A	Answers	Rating	Expected Answers
	Indicat	ors			
Me	tric Ide	entity	MUF-1	F	
	Q1	What is the the metric formula? (please refer to related base metrics)			
	Q2	What is the scale of the metric data? (nominal, ordinal, interval, ratio, absolute)			Ratio, Absolute
	Q3	What is the unit of the metric data?			
	Q4	What is the type of the metric data? (integer, real, etc.)			
	Q5	What is the range of the metric data?			
Dat	a Exist	ence	MUF-2	F	
	Q6	Is metric data existent?			Available ≻10
	Q7	What is the amount of overall observations?			
	Q8	What is the amount of missing data points?			
	Q9	Are data points missing in periods? (If yes, please state observation numbers for missing periods)			
	Q10	Is metric data time sequenced? (If no, please state how metric data is sequenced)			
Dat	a Verif	iability	MUF-3	F	
	Q11	How is metric data calculated? (by a tool, manually, etc.)			
	Q12	Is all metric data calculated the same way? (by a tool, manually, etc.)			Yes
	Q13	Is all metric data calculated according to metric formula?			Yes
	Q14	Where is metric data stored? (in a file, database, etc.)			
	Q15	Is all metric data stored in the same place? (in a file, database, etc.)			Yes
Dat	a Depe	ndability	MUF-4	F	
	Q16	Is metric data stored precisely?			Yes
	Q17	Is metric data stored for a specific purpose?			Yes
	Q18	Is the purpose of metric data storage known by process performers?			Yes
	Q19	Is metric data analyzed and reported?			Yes
	Q20	Is metric data analysis results communicated to process performers?			Yes
	Q21	Is metric data analysis results communicated to management?			Yes
	Q22	Is metric data analysis results used as a basis for decision making?			Yes
Dat	a Norn	nalizability			
	Q23	Can metric data be normalized by parameters or metrics? (If yes, please specify them)			
Dat	a Integ	rability			
	Q24	Is metric data integrable at project level?			
	Q25	Is metric data integrable at organization level?			

(a) Metric Usability Questionnaire

Metric Name:		
Conceptual Definition:		
Assessed On:		
Assessed By:		
Metric Usability Attributes	Rating	Expected Rating
Metric Identity (MUF-1)	F	F
Data Existence (MUF-2)	F	F
Data Verifiability (MUF-3)	F	L or F
Data Dependability (MUF-4)	F	L or F
MUF-3&4 for base metric-1	F	LorF
MUF-3&4 for base metric-2	F	L or F
MUF-3&4 for base metric-n	F	L or F
Metric Usability Result	F	L or F (Usable) Not Usable otherwise

(b) Metric Usability Rating

Figure 18 Metric Usability Questionnaire and Rating for Derived Metrics

For example, assume that the usability of "defect density" derived metric is evaluating and rate the attribute values as [F, F, F, L]. If the values of metric usability factors 3 and 4 of base metric "number of defects" are [F, L], the factors were coded as "L" (the lowest of [F, L]) as basis for evaluating usability of "defect density". Similarly, if the values of metric usability factors 3 and 4 of base metric "product size" are [L, L], the factors were coded as "L" again (the lowest of [L, L]). Then, since the metric usability factors of "defect density" are rated as [F, F, F, L] and the usability ratings for factors 3 and 4 for both base metrics are "L", it was concluded that "defect density" derived metric is *usable* for statistical analysis. However, if the value of metric usability factor 3 or 4 was P for any of the base metrics, "defect density" would *not be usable* for statistical analysis.

Process Execution Questionnaire is a form used to investigate the external factors that might affect a process execution so that assignable causes exist. External factors are questioned in terms of changes in process performers, process environments, and other factors if any (Figure 19). While working retrospectively on existing process data, this form is used to understand the assignable causes for a process execution if it led to an out-of-control point. In a prospective study, however, the form is filled for each instance of the process in execution to identify the external factors that might be a potential assignable cause.

Proces	s Name:	Recorded	On:
Proces	s Execution No:	Recorded	Ву:
Exter	nal Attributes	Status	Explanation
		(Yes/No)	
PROC	ESS PERFORMERS		
Q1	Are process performers trained in their roles in the process?		
Q2	Are process performers experienced in their roles in the process?		
Q3	Are process performers differed per role basis during execution of		
	the process?		
PROC	ESS ENVIRONMENT		
Q4	Has there been a recent change in location?		
Q5	Has there been a recent change in support systems?		
	(infrastructure, technology, etc.)		
Q6	Has there been a recent change in communication channels and		
	mechanisms? (structure, media, etc.)		
Q7	Has there been a recent change in funding and resources allocated		
	for the process?		
Q8	Has the process been tailored for this specific execution?		
OTHE	R FACTORS (Please list if any)		

Figure 19 Process Execution Questionnaires

4.4 An Assessment and Analysis Tool for Statistical Process Control

SPC-AAT has facilities to capture data from outer environment, assess the suitability of software processes and metrics for SPC, and analyze a software process with respect to its qualifying metrics using SPC techniques like control charts, histograms, bar charts, and pareto charts. Accordingly, user interface of the tool has three main views: Process Data, Assessment, and Process Improvement.

SPC-AAT works integrated with other tools in the environment which hold measurement data about the processes performed. When measurement data is imported to SPC-AAT, all necessary assets are created automatically by the tool before SPC assessment and analysis are started.

The SPC techniques are applied on "process cluster - metric" pairs. A metric value which is detected as out-of-control point (OCP) according to the tests applied can be excluded from the analysis via the tool. To exclude an OCP and see related process execution questionnaire, one just clicks on the point on a control chart. SPC-AAT also supports what-if analysis for different stratification choices by merging and splitting current process clusters. As a last thing, SPC assessment and analysis results can be reported and printed by using the tool [32, 33].

5 CASE STUDY

The project used in this study had been implemented based on the Organization Software Development Methodology which depends on waterfall model. This methodology has been generated to cover the goals of CMMI L3 (Figure 20). This study is about the System Testing phase of the project.



Figure 20 Organization Software Development Methodologies

One of the CMMI L3 process areas is Verification and Validation. System Testing is subject to this area and instructions of the system testing in our organization are defined below:

The system test design activity can be initiated by the completion of SRS and is completed before the start date of the system tests. System tester/test team prepares the system test cases based on the test strategy defined in the Test Plan and business scenarios/use cases identified in the SRS. System tester/test team records the system test cases into the requirements management tool and establishes the traceability between the system test cases and Use cases. The system test environment is prepared in accordance to the requirements defined in the Test Plan. System tester/test team ensures that the system test environment is ready with respect to the system environment requirements defined in the Test Plan. The system to be tested is integrated and deployed to the system test environment. System Tester/Test Team perform(s) the system tests according to the test methods, constraints and validation criteria that are stated in the System Test Case Document. System Tester/Test Team ensure(s) that the system works as it is expected in its intended operational environments. System Tester/Test Team issues the defects that are found in product and product component test and issues via Configuration Management Tool. At the end of the system test, System Tester/Test Team update(s) the System Tester/Test Team places the records the results in the related documents. System test results are analyzed and recorded periodically and corrective actions are taken if necessary.

If we look at the purpose of this study, we need to explain which coverage methods are being used to implement system testing activity. In our organization, path coverage has been defined, but node coverage has not been defined at system test level shown in Table 2.

Path	testing	Independent	paths	(basis	paths)	through	the	control			
(path coverage)		structure of the operational scenarios are exercised.									
		Activity diagra system level.	ams ca	n be us	ed to de	efine the t	test c	ases at			
Stateme	ent	Not applicable	e at syst	tem leve							
testing											
(stateme	ent/										
node co	verage)										

Table 2 The Interpretation of Path and Node Coverage at System Test Level

Two case studies were implemented at a project-based working software organization (referred as organization X in the study) having CMMI L3. System test

process of the project and related metrics of these processes had been worked on. These metrics were used in the case studies can be seen in Table 3.

The project used here is a large data entry and query system developed on networked, client/server, server utilizing Java and IBM DB2. The project has two modules, Data Entry and Reporting. System testing has contained both modules and these modules were tested together. The project had been developed during 6 months with a staff of 5 with approximately 8,000 lines of code. The project had achieved L3 in the SW-CMMI, and the organization is pursuing L4. All L4 processes were installed and conducted on the project during a period of time.

Table 3 Metrics (Base and Derived) used in the Case Studies

Metric Name	Description
Number of Test Cases Defined	Base Metric
Number of Failed Test Cases	Base Metric
Number of Passed Test Cases	Base Metric
Functional Size	Base Metric
Test Case Execution Time	Base Metric
Test Defect Density (# Failed Test Cases / # Test Cases Defined)	Derived Metric
Test Effectiveness (# Failed Test Cases / Test Case Execution Time)	Derived Metric
Test Speed (# Test Cases Defined / Test Case Execution Time)	Derived Metric

For the both case studies described in this study, two coverage methods had selected to implement. The first method is "Node Coverage" method that there has been 18 user interfaces, 191 nodes had been tested; and the second one is "Path Coverage" method that there has been 18 user interfaces, 69 paths and related 297 nodes had been tested and data had been recorded prospectively for both case studies, Case Study A and Case Study B. Number of node is larger for Path Coverage case in result of there were duplicated test cases for different paths. Interface is the unit of measure for both case studies. Test cases are utilized as data for these interfaces. Test metrics are an important indicator of the effectiveness of a software testing process. Test metrics that had been defined in this study were decided in according to section 2.3 of this study. All metrics defined

for the case studies can be seen from Table 3 were collected at interface based except the "Test Case Execution Time" base metric. Test Case Execution Time base metric was collected at test case based, then the total time for this metric was evaluated. Besides, in this study first passes of test cases were evaluated, second and third passes were not evaluated because of the time constraint caused by the organization.

Although there is no historical data and ability of the process to generate 20-25 metric data points in the near future [31], in result of this project is a real time project, executed processes are 18 for each case.

One often assumes that the data are from an approximately normally distributed population. This is frequently justified by the classical central limit theorem, which says that sums of many independent, identically-distributed random variables tend towards the normal distribution as a limit. If that assumption is justified, then about 68 % of the values are within 1 standard deviation of the mean, about 95 % of the values are within two standard deviations and about 99.7 % lie within 3 standard deviations [34].

The rules shown in Figure 21 were chosen to be used when detecting Out-of Control Points.

Individuals Chart - Options 🛛 🔯											
Parameters Estimate S Limits Tests Stages Box-Cox Display Storage											
Perform the following tests for special causes											
✓ 1 point > 3 standard deviations from center line											
□ 9 points in a row on same side of center line											
📕 6 points in a row, all increasing or all decreasing											
14 points in a row, alternating up and down											
\square 2 out of 3 points > 2 standard deviations from center line (same side)											
☐ 4 out of 5 points > 1 standard deviation from center line (same side)											
☐ 15 points in a row within 1 standard deviation of center line (either side)											
☐ 8 points in a row > 1 standard deviation from center line (either side)											
Help <u>O</u> K Cancel											

Figure 21 Rules for Out-of-Control Points

5.1 Case Study A

In the scope of Case Study A, system testing of a real time project was utilized. Firstly, SRS document was written by the system analyst of the project in April 2007. STC document was written according to SRS document in May 2007 by a system tester. Test cases were written per user interface defined in the SRS document. "Node Coverage" method has been implemented to 18 user interfaces, and 191 nodes were utilized for this case.

SPC assets were used for collecting data in this case. When this case of the study had started, SPC-AAT was not ready to use. It is aimed to collect data prospectively, therefore all information were recorded to the forms which were provided in Appendix A and these information were saved in the folders. After the SPC-AAT had got ready to utilize, all data were entered to SPC-AAT.

Process attribute values were identified to put on process similarity matrices by filling process execution records. 191 test case instances were sampled and a process execution record (completed questionnaires for all metrics identified in Case Study A are provided in appendix A) was completed for each. The information on process execution records were provided typical values of process attributes, and formed an initial base for creation of the similarity matrix. There were 18 process execution records for system test. Completed process similarity matrix for Inputs, Outputs, Activities, Roles, and Tools & Techniques of all system test process instances can be seen from Figure 22 to 26.

SPC-AAT CONStruction of the second se															
PROCESS DATA	PROCESS DATA MASSESSMENT PROCESS IMPROVEMENT														
Consistency Assess Similarity Matrix Pro	ment 🔾 Metrics Evalu	iation													
Inputs	Process Attributes	PE1	PE2	PE3	PE4	PE5	PE6	PE7	PE8	PE9	PE10	PE11	PE12	PE13	PE14
Outputs	SRS		V		F	P	P	<pre>P</pre>	P	F	V	F	P	F	
Rolos	UC NODE	V	~	~	2	2	V	~	2	2	~	2	2	2	
Tools & Techniques	STC	V	V	2	2	2	V	V	2	2	V	V	V	~	
	•														

Figure 22 Similarity Matrixes for Inputs - Case Study A

SPC - AAT Workspace Assessm	ient Process Improvem	ent Help	2										2
PROCESS DATA		M ASSESSI	MENT		D PRC)CESS IMPRO	VEMENT						
Consistency Assess Similarity Matrix Pr	sment O Metrics Evalu	ation											
Inputs	Process Attributes	PE1	PE2	PE3	PE4	PE5	PE6	PE7	PE8	PE9	PE10	PE11	
Activities	UC_NODE	V	V	V	V	V	V	V	~	~	r	V	
Roles	STC	2	V	V	V	2	V	V	2	2	2	V	
Tools & Techniques	1			1									•

Figure 23 Similarity Matrixes for Outputs - Case Study A

SPC - AAT Workspace Assessm	ent Process Improve	ment Help	2										
PROCESS DATA		M ASSES	SMENT		D P	ROCESS IMPF	ROVEMENT						
Consistency Assess Similarity Matrix Pn	sment 🔷 Metrics Eval	luation											
Inputs	Process Attrib	PE1	PE2	PE3	PE4	PE5	PE6	PE7	PE8	PE9	PE10	PE11	F
Activities	Save Test Result	r	~	2	V	V	~	~	V	V	V	2	
Roles	Run Test Case	V	2	2	2	~	2	2	~	V	×	×.	
Tools & Techniques	Create Test Package						×		V	V			
	•												•

Figure 24 Similarity Matrixes for Activities – Case Study A

b SPC - AAT												-	
Workspace Assessm	ent Process Impro	vement Hel	p										
	-												
PROCESS DATA		M ASSE	SSMENT		ð	PROCESS IM	PROVEMENT						
Consistency Asses Similarity Matrix Pr	sment 🔍 Metrics E rocess Clusters	valuation											
Inputs	Process Attr	PE1	PE2	PE3	PE4	PE5	PE6	PE7	PE8	PE9	PE10	PE11	PE'
Activities	System Tester	r	r	V	×	r	r	r	r	~	r	2	
Roles Tools & Techniques													

Figure 25 Similarity Matrixes for Roles – Case Study A

SPC - AAT Workspace Assessm	nent Process Improv	ement Help											
PROCESS DATA		M ASSE	SSMENT		Ð	PROCESS IMP	ROVEMENT						
Consistency Assess Similarity Matrix Pr	sment 🔘 Metrics Ev rocess Clusters	aluation											
Inputs	Process Attri	PE1	PE2	PE3	PE4	PE6	PE6	PE7	PE8	PE9	PE10	PE11	PE
Activities	Internet Explorer	~	×	2	2	~	V	2	2	~	~	2	
Roles	CA Harvest						×		2	~			1
Tools & Techniques	Microsoft Word	~	~	2	~	2	V	2	2	2	2	2	
	Microsoft Excel	V	×	V	2	V	V	×	2	V	V	×	
	4								1				
									1				

Figure 26 Similarity Matrixes for Tools & Techniques - Case Study A

Process similarity matrix for similarity and differences were analyzed in process executions. After finalizing the matrix, 2 process clusters were labeled A and B as shown in Figure 27. The number of data points were not enough (at least 20) for Version A and Version B. Though, we decided to chart data separately for these two versions to understand the effects of process clustering.

👙 SPC - AAT Workspace Assessment Pr	ocess Improvement Help
PROCESS DATA	ASSESSMENT PROCESS IMPROVEMENT
Process Clusters	Its Summary 🔘 Included Metric Data Points
Process Clusters Process Cl# of Proces Version A ● 11 Version B ● 7	Process Cluster Detail Record Info Inputs Outputs Activities Roles Tools & Techniques Process Cluster:

Figure 27 Base Process Clusters for System Test Process

e <u>N</u> avigation <u>Z</u> oom <u>H</u> elp	
▤▤ ≪ < > » °	€
Process Cluster Name	# of Process Executions

Figure 28 Process Clusters Report

As shown in Figure 29 distances between the process clusters is 2. These distances are based on Process attributes defined in activities and tools&techniques of Process Clusters A and B.

Cluster Pairs	Distance	
rsion A-Version B	2	

Figure 29 Process Cluster Distances & Process Attributes

Create test package activity shown and CA Harvest tool made the difference between these two clusters shown in Figure 30 and Figure 31.

Clust sion A	er Pairs Version B	Distance 2			
:ess outs	Attributes – Outputs	Activities	Roles	Tools & Te	echniques
	Process Atti	ributes	Ve	rsion A	Version B
	t Result			~	2
e Te:				~	V
e Te: Tes	t Case				

Figure 30 Process Cluster Distances & Process Attributes

rsion A	-Version B	2				
ocess	Attributes—	Kanatana K	Dalas	Taala 0 T.		
nputs	Outputs	Acumues	Rules		echniques	_
	Process Attr	ibutes	Ve	rsion A	Version B	
ternet l	Explorer			V	P.	
A Harve	est				V	
	t Word			~	×	
icrosof	Execut			~	P.	
crosof crosof	LEAGEI					_

Figure 31 Process Cluster Distances & Process Attributes

After identification of initial process clusters, process metrics were utilized to evaluate their usability for statistical analysis. Number of test cases defined, test case execution time, number of passed test cases, number of failed test cases, and functional size as base metrics were identified. These were the metrics for which data were available on the tool. From the base metrics, test defect density, test effectiveness and test speed were identified as derived metrics of the system test process.

Metric Usability Questionnaire was filled for each base and derived metric from Questionnaire tab-sheet under Metric Evaluation view (excel sheet was filled before the tool had been ready to use). Example questionnaire for "Number of Test Cases Defined" base metric with its info, questionnaire and usability ratings are shown in Figure 32 (completed questionnaires for all metrics identified in Case Study A are provided in Appendix C).

SPC - AAT Aorkspace Assessment Proc	ess Improvement Help	
PROCESS DATA	M ASSESSMENT	
Contention: Derived Million Process Middle: Tertibate U. Practage U	Matric Usability Assessment Detail General Info Ouestionnaire Usability Rating Matric Name: FTest Cases Defined for Gystem Testing Conceptual Definition: Fold Number Test Cases Defined for Gystem Testing Assessed Or: 25 Mar 2007 Assessed By: CALTUN	
	Save	Metric Usability Assessment

(a) General Info Tab

	🏂 婱	?				
PROCESS DATA	M ASSESS	SMENT	1	PROCESS IMPROVEMENT		
ase Metrics Derived Metrics Process Metrics Metric Name Metric	Metric Usability Assess	nent Detail	Usability Rating			
# Test Case OU. L Fests Case OU. X # Prased To OU. V. X # Failed Te. OU. V. # Failed Te. OU. V.	Metric Identity Data Existence Data Verifiability Data Dependability Data Normalicability Data Integrability	0. 1 What I 2 Which 3 Which 4 What I 5 How i 6 What I 7 What I 8 What I	is the name of the r entity does the me attribute of the enti- is the type of the m s metric data calcu- is the scale of the r is the unit of the m- is the type of the m	Ouention medice? dric measure? dric measure? dric? (direct, indirect) atted? (genet) metric formula if the ty- metric data? (merinal, ordinal, interva dric data? dric data? (manjen, real, etc.)	Answer # Executed Test Cases Number Test Case Number Direct Absolute Number Integer	
		and the second s			10.0.305	

(b) Questionnaire Tab

PROCESS DATA	M ASSESSMENT	PROCESS IMPROVEME	NT	
Consistency Assessment Se Metrics Derived Metrics rocess Metrics Metric Name Metric	Metrics Evaluation Metric Usability Assessment Detail General Info Guestionnaire Usability Ra	ting		
Test Case U U est Case U U Passed T. U U Failed Te. U U unction Po. U	Metric Usability Attributes Metric listendity Data Existence Data Vertilacitity Data Dependacitity	Rating OF OL U	Expected Rating	

(c) Usability Rating Tab

Figure 32 Metric Usability Questionnaire and Rating for Number of Test Cases Defined

The usability status of all base and derived metrics are listed in Figure 33. All the metrics which were defined at the beginning of this case are usable for the node coverage method for system testing process and usability states can be seen from metric usability evaluation report.

le	e <u>N</u> avigation <u>Z</u> oom <u>H</u> elp		
(» 🔍 🔍 100 %	•
	Metric Name	Туре	Metric Usability
	# Test Cases Defi	Base	Usable
	Test Case Executi	Base	Usable
	# Failed Test Cases	Baga	Usable
	Function Point	Base	Usable
	Test Defect Density	Derived	Usable
	Test Effectiveness	Derived	Usable
	Test Speed	Derived	Usable
T			

Figure 33 Metric Usability Report for Node Coverage Process

Test data for node coverage method used in Case study A was completed in SPC-AAT as shown in table 34.

2 SPC-AAT													
Workspace Assess	ment Process Impr	ovement Help											
PROCESS DAT	A	ASSESSMEN	т	PROCESS I	MPROVEMENT								
O Process Executions 💿 Metric Data													
Process Execu	# Test Cases	Test Case Exe	# Passed Test	# Failed Test	Function Point	Test Defect De	Test Effectiven	Test Speed	Process Cluster	1			
1	11	19	11	0	5.170000076293945	0	0	0.05779999867081	Version A				
2	12	32	12	0	7.039999961853027	0	0	0.375	Version A				
3	16	63	16	0	14.279999732971191	0	0	0.2529999911785126	Version A				
4	15	62	15	0	13.119999885559082	0	0	0.2409999966621399	Version A				
5	14	42	14	0	5.920000076293945	0	0	0.0949999988079071	Version A				
6	15	50	14	1	16.3799991607666	0.6665999889373779	0.01999999955296	0.30000001192092	Version B				
7	11	27	11	0	3.5399999618530273	0	0	0.40700000524520	Version A				
8	10	36	9	1	4.579999923706055	0.10000000149011	0.02700000070035	0.2770000100135803	Version B				
9	10	34	8	2	7.559999942779541	0.20000000298023	0.05799999833106	0.2939999997615814	Version B				
10	4	17	4	0	2.9800000190734863	0	0	0.23499999940395	Version A				
11	4	13	4	0	3.6500000953674316	0	0	0.3070000112056732	Version A				
12	8	29	8	0	4.840000152587891	0	0	0.2750000059604645	Version A				
13	5	9	3	2	3.869999885559082	0.4000000059604645	0.22200000286102	0.5550000071525574	Version B				
14	5	15	2	3	5.380000114440918	0.6000000238418579	0.20000000298023	0.3330000042915344	Version B				
15	16	70	14	2	16.760000228881836	0.125	0.02800000086426	0.2280000001192093	Version B				
16	17	57	14	3	7.78000020980835	0.17640000581741	0.05200000107288	0.2980000078678131	Version B				
17	8	25	8	0	2.9800000190734863	0	0	0.3199999928474426	Version A				
18	10	39	10	0	6.980000019073486	0	0	0.2563999891281128	Version A				
18	10	39	10	0	6.980000019073486	0	0	0.2563999891281128	Version A				

Figure 34 Metric Data of Case Study A

SPC tools were applied to the qualified process cluster – derived metric pairs. In this case (node coverage method), control charts drawn for process clusters - derived metric pairs are shown in the figures 35 to 37.



(a) Defect Density Metric for Version A-B



(b) Defect Density Metric for Version A (c) Defection

(c) Defect Density Metric for Version B



As it can be seen from Figure 35, version A indicates the process executions which do not contain any defected test cases. On the other hand, Version B indicates the process executions which contain defected test cases. Figures 35(a), 35(b) and 35(c) show that clustering worked well for defect density metric when using in node coverage method. It is because figure 35(a), version A-B, has one out of control point; where as figure 35(b), version A, and figure 35(c), version B, have no out of control points. Mean value of version A is equal to 0 (zero) because of the process executions of version A did not have failed test cases.



(a) Test Effectiveness Metric for Version A-B







Figure 36 Individuals Charts for Derived Metrics of Test Effectiveness for Node Coverage

When looking at the figure 36(a) version A-B distribution by Test Effectiveness metric, there are two out of control points; where as figure 36(b), version A, and figure 36(c), version B, have no out of control points. Version A (36(b)) indicates the process executions which do not contain any defected test cases. On the other hand, Version B (36(c)) indicates the process executions which contain defective test cases. Clustering here identified and classified process executions on the basis of the similarity of the characteristics they possess. Figures 36(a), 36(b) and 36(c) show that clustering worked well for test effectiveness metric when using in node coverage method. Mean value of version A is equal to 0 (zero) because of the process executions of version A did not have failed test cases.



(a) Test Speed Metric for Version A-B



(b) Test Speed Metric for Version A

(c) Test Speed Metric for Version B

Figure 37 Individuals Charts for Derived Metrics of Test Speed for Node Coverage

For node covarage method, test speed metric for all versions is under control can be seen in figures 37(a), 37(b) and 37(c). It can be said that test speed values calculated for this case are stable. The mean value of test speed for version A was lower than the mean value of test speed for version B, because number of defined test cases have a direct ratio with test speed derived metric. Nevertheless number of test cases defined for version A are higher than number of test cases defined for version B. Besides figure 37 shows that clustering does not have remarkable effect on test speed metric when using in node coverage method. A comparison of control charts of derived metrics between Case A and Case B (that is, between node coverage and path coverage system testing techniques) is provided in the discussion section 6.1.

5.2 Case Study B

In this case, system testing of a real time project was implemented. Firstly, SRS document was written by the system analyst of the project in April 2007. STC document was written by the system tester according to SRS document in May 2007. Test cases were written per user interface defined in the SRS document. "Path Coverage" method has been implemented to 18 user interfaces, 69 paths, and 297 nodes in this case.

SPC-AAT tool was utilized for collecting data in this case. When this case was started to work, SPC-AAT was ready to use. Therefore all data were entered to SPC-AAT and Statistical Software tool (Minitab) was utilized for statistical analyses.

Process attribute values were identified to put on process similarity matrices by filling process execution records. For the path coverage case, 297 test case instances were sampled and process execution record (completed questionnaires for all metrics identified in Case Study B are also provided in appendix A) was completed for each. The information on process execution records provided typical values of process attributes, and formed an initial base for creation of the similarity matrix. There were 18 process execution records for system test path coverage method. Completed process similarity matrix for Inputs, Outputs, Activities, Roles, and Tools & Techniques of all system test process instances can be seen from Figure 38 to 42.

👙 SPC - AAT												
Workspace Assessment Process Improvement Help												
PROCESS DATA												
Consistency Asses	sment 🛛 Mel	rics Evaluati	on									
Similarity Matrix P	rocess Cluster:	s										
Inputs	Drava	054	DE0	DE0	DE4	056	DES	057	DEO	DEO	0540	
Outputs	Proce	PET	PEZ	PE3	PE4	PES	PEb	PET	PE8	PE9	PETU	
Activities	SRS	V	~	2	~	2	~	V	~	r	×	
Roles	UC_NODE	V	2	r	2	×	V	V	V	V	V	
Tools & Techniques	STC	V	V	r	r	~	V	V	V	V	r	
												-
	4											•
	1200											

Figure 38 Process Similarity Matrixes for Inputs – Case Study B

SPC - AAT Workspace Assess	nent Process	Improvemen	t Help										
PROCESS DAT	PROCESS DATA M ASSESSMENT												
Consistency Assessment Metrics Evaluation													
Similarity Matrix P	rocess Clusters	\$											
Inputs	Proce	PE1	PE2	PE3	PE4	PE5	PE6	PE7	PE8	PE9	PE10	τI	
Outputs	UC NODE	V	V	V	V	V	V	V	V	V	V		
Activities	STC	r	V	V	V	V	K	V	V	V	V		
Koles	-												
Tools & rechniques	-												
	•			II.			_						

Figure 39 Process Similarity Matrixes for Outputs – Case Study B



Figure 40 Process Similarity Matrixes for Activities – Case Study B

👙 SPC - AAT													
Workspace Assessn	nent Process	Improvemen	t Help										
PROCESS DATA	P PROCESS DATA ASSESSMENT PROCESS IMPROVEMENT												
Consistency Asses Similarity Matrix P	Consistency Assessment Metrics Evaluation Similarity Matrix Process Clusters												
Inputs	Broce	DE1	PE2	PE2	DEA	PES	PEG	DE7	DEO	PEO	PE10		
Outputs	11008	161	1 2	165	1 64	T LS	120	1.67	120	1 25	1 1 1 1 1		
Activities	System Le	V	r	~	r		V	V	V		V		
Roles													
Tools & Techniques	-											-	
	4			П									

Figure 41 Process Similarity Matrixes for Roles – Case Study B
👙 SPC - AAT												•
Workspace Assessm	ent Process	Improvemen	t Help									
	8											
PROCESS DATA		м	ASSESSME	NT		PROC	ESS IMPROVE	MENT				
Consistency Assess Similarity Matrix Pr	sment 🔾 Met ocess Clusters	rics Evaluati	on									
Inputs	Proce	PE1	PE2	PE3	PE4	PE5	PE6	PE7	PE8	PE9	PE10	T
Outputs	Internet Ex	2	~	2	~	~	~	~	~	V	~	
Roles	CA Harvest	2		~	~	V		~	~	~		
Tools & Techniques	Microsoft W	2	~	~	2	~	~	~	~	r	2	
	Microsoft E	V	~	2	V	V	V	V	V	V	V	-
	4											•

Figure 42 Process Similarity Matrixes for Tools and Techniques - Case Study B

Process similarity matrix for similarity and differences were analyzed in process executions for Case Study B. After finalizing the matrix, 2 process clusters labeled A and B as shown in Figure 43. The number of data points was not enough (at least 20) for Version A and Version B. Though, it is decided to chart data separately for these two versions to understand the effects of process clustering.

👙 SPC - AAT	
Workspace Assessment Process Im	provement Help
PROCESS DATA	ASSESSMENT PROCESS IMPROVEMENT
Process Clusters Cresults Summ	ary 🔿 Included Metric Data Points
Process Clusters	Process Cluster Detail
Process Cluster # of Process Ex	Record Info Inputs Outputs Activities Roles Tools & Techniques
Version A 0 11 Version B 7	Process Cluster: Recorded On: Recorded By:

Figure 43 Base Process Clusters for System Test Process – Case Study B

Process Clusters Report - Print Previe ile Navigation Zoom Help	W	
	€	S
-		
Process Cluster Name	# of Process Executions	
Vergion A	11	
VELSION A		

Figure 44 Process Clusters Report – Case Study B

As shown in Figure 45 distance between the process clusters is 2. This distance is based on Process attributes defined in activities and tools&techniques of Process Clusters A and B.

luster Distances—	ances & Process Attributes	
Cluster Pairs	Distance	
ersion A-Version B	2	

Figure 45 Process Cluster Distances & Process Attributes

Create test package activity shown in Figure and CA Harvest tool caused the difference between these two clusters shown in Figure 46 and Figure 47.

Clus sion A	ter Pairs -Version B	Distance 2			
cess	Attributes-	1			
puts	Outputs	Activities	Roles	Tools & To	echniques
	Process Att	ributes	Ver	sion A	Version B
				2	V
ve Te	st Result				
ve Te n Tes	st Result t Case			V	K

Figure 46 Process Cluster Distances & Process Attributes

Clus sion A	ter Pairs -Version B	Distance 2				
cess	Attributes—					
				1992		
puts	Outputs	Activities	Roles	Tools & T	echniques	
nputs	Outputs Process Attr	Activities	Roles Ve	Tools & T	echniques Version	в
iputs temet l	Outputs Process Attr Explorer	Activities	Roles Ve	Tools & T rsion A	Version	В
emet I Harv	Outputs Process Attr Explorer est	Activities	Roles Ve	Tools & T rsion A	Version	В
emet I Harv	Outputs Process Attr Explorer est	Activities	Roles Ve	Tools & T rsion A V V	Version	В

Figure 47 Process Cluster Distances & Process Attributes

After identification of initial process clusters, process metrics were utilized to evaluate their usability for statistical analysis. Number of test cases defined, test case execution time, number of passed test cases, number of failed test cases, and functional size as base metrics were identified. These were the metrics for which data was available on the tool. From the base metrics, test defect density, test effectiveness and test speed derived metrics were identified for the system test process.

Metric Usability Questionnaires was filled for each base and derived metric from Questionnaire tab-sheet under Metric Evaluation view. Example questionnaire for "Number of Test Cases Defined" base metric with its info, questionnaire and usability ratings given are shown in Figure 48 (completed questionnaires for all metrics identified in Case Study B are provided in Appendix C).

orkspace Asses	sment Proces	s Improvement Help	2				(
PROCESS DA	ITA	M ASSES	SMENT		PRO	ICESS IMPROVEMENT	
Consistency Ass Rase Metrics Di Process Metrics	essment · M	etrics Evaluation	iment Deta				
Metric Name Mot #Test Case		General Info Quest	tionnaire ≢TestCa	Usability Rating	stern Testing		
		Conceptual Definition: Assessed On: Assessed By:	Total Numi 25 May 20 C ALTUN	ber Test Cases D 07	efficied for Syste	m Testing	 (***

(a) General Info Tab

	2	2	
PROCESS DATA	M ASSESS	MENT PROCESS IMPROVEMENT	
ase Metrics Derived Metrics Process Metrics	Metric Usability Assess	verit Detail	
Protices U. Francisco U. Parset T. U. Parset T. U. Face T. U. Function Po. U.	Metricic klentity Data Existence Data Verifiability Data Dependability Data Normalizability Data Integrability	Ourselfon 1 What is the name of the metric? 2 Which enthy does the metric measure? 3 Which stitute of the enthy does the metric: measure? 4 What is the type of the metric? (direct, indirect) 5 How is metric data calculated? (specify metric formula if the ty 6 What is the seale of the metric data? (metric formula, interva 7 What is the unit of the metric data? 8 What is the type of the metric data? 9 What is the type of the metric data? 10 Material the metric data? 11 What is the unit of the metric data? 12 What is the type of the metric data? 13 What is the type of the metric data? 14 What is the type of the metric data?	Answer # Executed Test Cases Number Test Case Number Derect Absolute Number Integer Integer

(b) Questionnaire Tab

PROCESS DATA	M ASSESSMENT		PROCESS IMPROV	ement		
consistency Assessment	Metrics Evaluation					
ocess Metrics	Metric Usability Assessment Detail					
letric Name Metric	General Info Questionnaire	Usability Rating				
est Case U.	Metric Usability Attribute	6	Rating		Expected Rating	1
Passed T 🧿 U	Metric Identity		₽ F	F		
Failed Te U	Data Existence		2			
incion Po. O	Data Dependability		ÖL.	L		-

(c) Usability Rating Tab

Figure 48 Metric Usability Questionnaire and Rating for Total Number of Test Cases Defined for System Testing Process

The usability status of all base and derived metrics are listed in Figure 49. All the metrics defined at the beginning of this case are usable for the path coverage method for system testing process and usability states can be seen from metric usability evaluation report.

e <u>N</u> avigation <u>Z</u> oom <u>H</u> elp			
$\blacksquare \bigtriangleup \ll < >$	» • • 10	00 % 💌	
Metric Name	Type	Metric Usability	
# Test Cases Defi	Base	Usable	
Test Case Executi	Base	Usable	
# Passed Test Cases	Base	Usable	
<pre># Failed Test Cases</pre>	Base	Usable	
Function Point	Base	Usable	
Test Defect Density	Derived	Usable	
Test Effectiveness	Derived	Usable	
Test Speed	Derived	Usable	

Figure 49 Metric Usability Evaluation Report – Case Study B

Test data for path coverage method used in Case study B was completed in SPC-AAT as shown in table 50.

vorkspace Assess	sment Process Imp	rovement Help							
	F								
PROCESS DAT	ra	M ASSESSMEN	п	PROCESS I	MPROVEMENT				
Process Executio	ns 💿 Metric Data								
Process Execu	# Test Cases	Test Case Exe	# Passed Test	# Failed Test	Function Point	Test Defect De	Test Effectiven	Test Speed	Process Cluster
	14	32	13	1	5.170000076293945	0.0714000016450882	0.03125	0.4375	Version A
	15	35	15	0	7.039999961853027	0	0	0.42849999666621399	Version B
	23	46	22	1	14.279999732971191	0.04340000078082	0.02173000015318	0.5	Version A
	16	45	15	1	13.119999885559082	0.0625	0.02222000062465	0.3555000126361847	Version A
	19	42	18	1	5.920000076293945	0.05260000005364	0.02380000054836	0.4523000121116638	Version A
	20	45	20	0	16.3799991607666	0	0	0.44440001249313	Version B
	14	42	12	2	3.5399999618530273	0.1428000032901764	0.04760999977588	0.33329999446868	Version A
	18	40	17	1	4.579999923706055	0.05550000071525	0.02500000037252	0.44999998807907	Version A
	18	54	16	2	7.559999942779541	0.11110000312328	0.03703000023961	0.33329999446868	Version A
	11	32	11	0	2.9800000190734863	0	0	0.34369999170303	Version B
	11	44	11	0	3.6500000953674316	0	0	0.25	Version B
	19	56	13	6	4.840000152587891	0.3156999945640564	0.10713999718427	0.3391999900341034	Version A
	11	36	11	0	3.869999885559082	0	0	0.30550000071525	Version B
	11	32	9	2	5.380000114440918	0.1817999929189682	0.0625	0.34369999170303	Version A
	29	64	28	1	16.760000228881836	0.03440000116825	0.01559999957680	0.4530999958515167	Version A
	32	82	27	5	7.78000020980835	0.15620000660419	0.0609700009226799	0.3901999890804291	Version A
	8	34	5	3	2.9800000190734863	0.375	0.08822999894618	0.23520000278949	Version A
	11	39	10	1	6.980000019073486	0.0908999964594841	0.02563999965786	0.28200000524520	Version A

Figure 50 Metric Data of Case Study B

SPC tools were applied to the qualified process cluster – derived metric pairs. In this case (path coverage method), control charts drawn for process cluster – derived metric pairs are shown in the figures 51 to 53.



(a) Defect Density Metric for Version A-B



(b) Defect Density Metric for Version A



(c) Defect Density Metric for Version B

Figure 51 Individuals Charts for Derived Metrics of Test Defect Density for Path Coverage

As it can be seen from Figure 51, version A indicates the process executions which do not contain any defected test cases. On the other hand, Version B indicates the process executions which contain defected test cases. Figures 51(a), 51(b) and 51(c) show that clustering does not have remarkable effect on defect density metric when using in path coverage method. It is because figure 51(a), version A-B, and figure 51(c), version B have no out of control points. For path covarage method, test defect density for version A-B, version A and version B is under control and the values are stable can be seen in Figure 51(a), 51(b), 51(c). Mean value of version A is equal to 0 (zero) because of the process executions of version A did not have failed test cases.







- (b) Test Eff. Metric for Version A
- (c) Test Eff. Metric for Version B

Figure 52 Individuals Charts for Derived Metrics of Test Effectiveness for Path Coverage

When looking at the figure 52(a) version A-B, figure 52(b), version A, and figure 52(c), version B distribution by Test Effectiveness metric, there are no out of control points. Version A (52(b)) indicates the process executions which do not contain any defected test cases. On the other hand, Version B (52(c)) indicates the process executions which contain defected test cases. Clustering here identified and classified process executions on the basis of the similarity of the characteristics they possess. Figures 52(a), 52(b) and 52(c) that clustering does not have remarkable effect on defect density metric when using in path coverage method. Mean value of version A is equal to 0 (zero) because of the process executions of version A did not have failed test cases. Test execution indicates high fail rate at process

execution #9, #16 and then sharp decrease at operation #12, #17 in result of failed test case number is greater in process execution #12 and #17.



(a) Test Speed Metric for Version A-B





(b) Test Speed Metric for Version A (c) Test Speed Metric for Version B

Figure 53 Individuals Charts for Derived Metrics of Test Speed for Path Coverage

For node covarage method, test speed metric for all versions is under control can be seen in figures 53(a), 53(b) and 53(c). It can be said that test speed values calculated for this case are stable. The mean value of test speed for version A was lower than the mean value of test speed for version B, because number of test cases defined for version A are higher than number of test cases defined for version B; although number of interfaces are less in version A.

A comparison of control charts of derived metrics between Case A and Case B (that is, between node coverage and path coverage system testing techniques) is provided in the next section.

6 SUMMARY AND CONCLUSIONS

6.1 Discussion on Case Study Results

Establishing control limits on derived metrics provides an organization the ability to predict the metrics that will be inserted into project work products, based on work product size. The use of a standard organizational software development determine readiness to move from one development stage to the next, and to predict future rework costs.

In this section, derived metrics were compared for the versions (A and B) seperately and merged clusters (A-B). One of the objective of this discussion was to understand if merging had positive or negative effects on the clusters. Derived metrics were also compared between node coverage and test coverage testing techniques, because another objective is to derive suggestions on which testing technique would be effective under specific circumstances. Negative values on derived metrics axis were not significant in result of 3 standard deviation of the mean had been implemented.

One of the variable could be utilized in these analyses are coefficient of variation (CV) which is a statistic that tells you how tightly all the various examples are clustered around the mean in a set of data.

Derived Metric	Node	e Coverage	(CV)	Path	Coverage	(CV)
(CV)	A_B	Α	В	A_B	Α	В
DD	1,6949	0,00	0,7197	1,1454	0,00	0,8176
TE	1,9937	0,00	0,9951	0,9888	0,00	0,6493
TS	0,3803	0,4088	0,3237	0,2074	0,2318	0,2049

Table 4 Comparison of Test Methods by Coefficient of Variation Values on the Basis of Clusters

In probability theory and statistics, the coefficient of variation (CV) is a measure of dispersion of a probability distribution. It is defined as the ratio of the standard deviation to the mean [34].

The coefficient of variation of the node coverage is greater than coefficient of variation of the path coverage except for test speed derived metric. The standard deviation of a normal distribution is equal to its mean, so its coefficient of variation is equal to mean values. Distributions with $CV < \mu$ are considered low-variance, while those with $CV > \mu$ are considered high-variance. Test defect density, test effectiveness and test speed derived metrics for both coverage techniques are considered high-variance except test speed derived metric of the path coverage techniques. It is considered low-variance as can be seen from Table 4.

The other variable utilized in this study is mean (μ) which is the sum of a list of data, divided by the total number of numbers in the data. Data analyzed in this study represents population which contains all data from test cases. If sample data was using, it would be possible to do hypothesis testing with the help of 2-Sample t to analyze the mean values with the standard deviations of this data. As a result, analyzing only mean values is significant for this study because of having population data. The comparison of control charts of derived metrics between Case A and Case B are demonstrated in Table 5.

Derived Metric	Node	e Coverage	e (µ)	Path Coverage (µ)			
(µ)	A_B A B		В	A_B A		В	
Defect Density	0,1260	0,0000	0,3240	0,0941	0,0000	0,1303	
Test Effectiveness	0,0337	0,0000	0,0867	0,0316	0,0000	0,0437	
Test Speed	0,2837	0,2565	0,3264	0,3710	0,3544	0,3773	

Table 5 Comparison of Test Methods by Mean Values on the Basis of Clusters

According to analysis of table 5, the path coverage and the node coverage methods in basis of clustering, it can be clearly seen that clustering is a good way to analyze with statistical methods based on test defect density, test effectiveness and test speed derived metrics. Therefore it can be stated the case studies that were worked on confirmed the SPC-AM. When looking at the Table 5, mean values of each cluster can be analyzed by means of both test techniques. The result of this cluster analysis is a number of heterogeneous versions with homogeneous contents which means that there are substantial differences between the versions, but the individuals within a single version are similar. Firstly, if defect density derived metric is analyzed for case studies A and B, it can be said that there had been found out more defects by doing system testing with node coverage technique than path coverage technique. Secondly, test effectiveness of node coverage is more than test effectiveness of path coverage. It can be said that node coverage is more effective technique than path coverage by looking at the mean values. Thirdly, by means of test speed derived metric, although number of test cases defined for path coverage technique are more than number of test cases defined for node coverage technique, test speed mean value of path coverage technique is greater than test speed mean value of node coverage technique. Using path coverage technique is less time consuming when performing the system testing.

6.2 Summary and Conclusion

Statistical Process Control (SPC) aims at quality improvement through reduction of variation. The best known tool of SPC is the control chart. After many experinces, the control charts have turned up to be a successful practical technique for monitoring process measurements.

A prospective study had been recently initiated on qualification test process for two case studies in this study. This study was performed to help the improvement of prospective studies will better capture information of process executions and data. For each of the case studies, different versions of processes (process clusters) were identified, evaluated the usability of process metrics and performed SPC analysis for the suitable process clusters and metrics. Node coverage method and path coverage method were utilized of a project at the same organization. The

organization at which case studies were performed is a software development organization having CMMI L3. In the first case, utilization of node coverage, base and derived metrics of system testing process were investigated. In the second case, utilization of path coverage and same metrics of node coverage process of the project were investigated. It was observed that the identification of process clusters is closely related to the purpose of quantitative analysis. In this study, the purpose was to understand qualification test process performance and the identified clusters were merged in such a way that the there will be no difference in testing practices in execution.

In this study, SPC - AM was used in order to test the suitability of SPC for the qualification test process and the metrics. With the help of Statistical Software tool (MINITAB), refining the product quality, improving process capability and managing projects have become pretty easy to control. The SPC–AM simply describes the way of understanding the context for identifying samples of process executions, identifying metrics for statistical analysis and also for the generated process data.

There were number of constraints related to the case studies and their applications. The first one was number of process executions for both case studies were less than the expectation of the assessment model. The clusters were merged to utilize these process executions. This was helpful to understand the benefit of merging these process executions. Second, however there were nearly 200 data points for each of case studies, metrics could just utilized on the interface based except the "test execution time" base metric. After having collected, test execution time was summed for each interface.

For qualification test (case study-A and case study-B), process clusters were identified for each of these two cases and all process metrics were evaluated as "largely usable" for statistical analysis. After control charting the data, it is observed that process clusters were under control with respect to the derived metrics of software test process for both case studies. If there is not adequate time to test all of the nodes that are covered by the test cases, path coverage method is a better way to find the failed functions in the system. Besides, second and third passes of these test cases should be evaluated to make consistent analyses for node coverage model.

71

According to analysis of table 5, the path coverage and the node coverage methods by mean values in basis of clustering, it can be clearly seen that clustering is a good way to analyze with statistical methods based on test defect density, test effectiveness and test speed metrics. Therefore it can be stated the case studies that were worked on confirmed the SPC-AM. The suggestions of this study are: 1. More test cases should be written to find out clearer analyses results and 2. Path coverage method for system testing should be preferred if there is time constraint on the system testing phase.

MINITAB Statistical Software tool was used to extract control charts in result of SPC-AAT was not beneficial enough to extract control charts in detail of having some information about statistical methods. On the other hand SPC-AAT reduced the time required for statistical analysis by providing a focal point to analyze the metric data besides collecting, organizing and assessing.

SPC-AAT was successful to ease rational sampling process. The attributes of process executions (inputs, outputs, activities, roles, tools & techniques) were entered and SPC-AAT automatically identified the process clusters.

SPC-AAT enhanced defining derived metrics and reduced the time required for calculation. Defining new derived metrics by using existing base or derived metrics was easy. New metrics were defined by just typing the name and the formula of the new derived metric and SPC-AAT calculated metric values for all process executions automatically.

It is obvious that the use of SPC (control charts) and other statistical methods can easily and effectively be used in a software testing in case studies implemented in this study. SPC can identify undesirable trends and can point out fixable problems and potential process improvements. Control charts can show the capability of the process, so achievable goals can be set. They can provide evidence of process stability, which can justify predicting process performance. SPC analysis can provide valuable information used in defect prevention and for lessons learned. SPC is relatively new to software development but after working on this study our observation is that SPC can support software process improvement and improve the quality of software products.

72

REFERENCES

- [1] CAIVANO, D., Software Maintenance and Reengineering, 2005. CSMR 2005.
 Ninth European Conference on Volume , Issue , 21-23 March 2005 Page(s): 288 293.
- [2] ROBESON, K., PROBERT, R. L., CHEN, Y., Effective Test Metrics for Test Strategy Evolution.
- [3] OLSSON, F., LUDBERG, H., 2003. Automated Module Testing of Embedded Software Systems. Lund University.
- [4] SEDIGH, S., GHAFOOR, A., GHAFOOR, A., 2002. Temporal Modeling of Software Test Coverage. 26 th Annual International Computer Software and Applications Conference.
- [5] DUMKE, R., BRAUNGARTEN, R., BLAZEY, M., HEGEWALD, H., REITZ, D., RICHTER, K., 2006. Software Process Measurement and Control. Otto-von-Guericke University.
- [6] DEMMY, W. S., PETRINI, A. B., Statistical Process Control In Software Quality Assurance.
- [7] WIDARA, M., Data Flow Coverage for Testing Erlang Programs, pp. 151-166.
- [8] Wang, Y., King, G., 2000. Software Engineering Processes Principles and Applications. CRC Press, Boca Raton London New York.
- [9] GRESSE, C., HOISLE, B., WÜRST, J., 1995. A process model for GQM-Based Measurement, STTI Report, University of Kaiserslautern, s.229.
- [10] LEWIS, R. O., Independent Verification and Validation, IEEE Transactions on Vehicular Technology, vol.40, no.4, s.708-713, 1991.
- [11] FLORAC, W. A., PARK, R. E., CARLETON, A. D., 1997. Practical Software Measurement: Measuring for Process Management and Improvement.
- [12] PUSALA, R., 2006. Operational Excellence through Efficicient Software Testing Metrics.

- [13] YU, Y. T., TANG, S. F., POON, P. L., CHEN, T. Y., 2001. "A study on a pathbased strategy for selecting black-box generated test cases, International Journal of Software Engineering and Knowledge Engineering.
- [14] KRISHNAMURTHY, S., and MATHUR, A.P., 1997. On the Estimation of Reliability of a Software System Using Reliabilities of its Components, Proceedings 8th International Symposium of Software Reliability Engineering (ISSRE), pp. 146-155.
- [15] Carleton, A. D., Paulk, M. C., 1997. Statistical Process Control (SPC) for Software.
- [16] Sommerville, I., 2001. Software Engineering, sixth edition, Pearson Education, Essex.
- [17] CMU/SEI, <u>Capability Maturity Model Integration</u> Version 1.1. Technical Report (Continuous: CMU/SEI-2002-TR-001, Staged: CMU/SEI-2002-TR-002), December 2001.
- [18] FENTON, N. E., 1991. Software Metrics: A Rigorous Approach. London: Chapman & Hall.
- [19] http://www.micquality.com/six_sigma_glossary/measurement_scales.htm
- [20] OLSSON, T., RUNESON, P., 2001. V-GQM: A Feed-Back Approach to Validation of a GQM Study, Metrics '01 - International Software Metrics Symposium.
- [21] PARK, R. E., GOETHERT, W. B., FLORAC, W. A., 1996. Goal Driven Software Measurement, Software Engineering Institute, Carnegie Mellon University.
- [22] Montgomery, D. C., Introduction to Statistical Quality Control, 4th Edition. Arizona State University.
- [23] JALOTE, P., SAXENA, A, 2002. Optimum Control Limits for Employing Statistical Process Control in Software Process. IEEE Transactions on Software Engineering Volume 28, s: 1126 – 1134.

- [24] FLORAC, W. A., CARLETON, A. D., 1999. Measuring the Software Process Statistical Process Conrol for Software Process Improvement.
- [25] LIPKE, W., 2002. "Statistical Process Control of Project Performance." CrossTalk.
- [26] PIWOWARSKI, P., MITSURU O., CARUSO, J., Coverage Measurement Experience During Function Test, International Business Machines Corporation.
- [27] BRIAND, L.C., LABICHE, Y., 2004. Improving State-Based Coverage Criteria Using Data Flow Information, Carleton University.
- [28] KANER, C., 2001. Measurement Issues and Software Testing. Florida Institude of Technology.
- [29] NIESSINK, F., VLIET, H., 2001. Measurement Program Success Factors Revisited. Information and Software Technology, Volume 43.
- [30] TARHAN ,A., DEMİRÖRS, O., Assessment of Software Process and Metrics to Support Quantitative Understanding.
- [31] TARHAN ,A., An assessment model for the applicability of statistical process control for software processes, 2006.
- [32] KIRBAŞ, S., TARHAN, A., DEMİRÖRS, O., An Assessment and Analysis Tool for Statistical Process Control of Software Processes.
- [33] KIRBAŞ, S., An assessment and analysis tool for statistical process control of software processes, 2007.
- [34] http://en.wikipedia.org/wiki/Coefficient_of_variation

APPENDICES

A. SPC-AM ASSETS



Figure 1 Process Execution Record

Proces	s Name:	Recorded On:				
Proces	Process Execution No:		Recorded By:			
Exter	nal Attributes	Status	Explanation			
		(Yes/No)				
PROC	ESS PERFORMERS					
Q1	Are process performers trained in their roles in the process?					
Q2	Are process performers experienced in their roles in the process?					
Q3	Are process performers differed per role basis during execution of					
	the process?					
PROC	ESS ENVIRONMENT					
Q4	Has there been a recent change in location?					
Q5	Has there been a recent change in support systems?					
	(infrastructure, technology, etc.)					
Q6	Has there been a recent change in communication channels and					
	mechanisms? (structure, media, etc.)					
Q7	Has there been a recent change in funding and resources allocated					
	for the process?					
Q8	Has the process been tailored for this specific execution?					
OTHEF	R FACTORS (Please list if any)					

Figure 2 Process Execution Questionnaire



Figure 3 Process Similarity Matrix

			Please rate each attribute in four scales, based on asnwers to questions as indicators			
Met	lletric Name:		F : Indicatiors of the atribute are fully satisfied (%8	6-100)		
Co	nceptu	al Definition:	L : Indicatiors of the atribute are largely satisfied (*	\$51-85)		
Ass	essed	On:	P : Indications of the attribute are largely satisfied (\$16-50)		
Ass	essed	By:	N : Indications of the attribute are not satisfied (%0-15)			
Attr	ibutes		Answers	Rating	Expected Answers	
	Indica	tors		Ť		
Med	ric Ide	ntity	MUE-1	F		
-	01	Which entity does the metric measure?				
	02	Which attribute of the entity does the metric measure?				
	03	When standard of the charge does the metric data? (nominal interval ratio absolute)			Ratio, Absolute	
	04	What is the unit of the metric data?				
	05	What is the type of the metric data? (integer real atc.)				
	06	What is the mass of the metric data?				
Dat	a Evict	ponacis che range of che mecho daca :	MUE-2	E		
	107	la matria data aviatant0	mor-e	<u> </u>	Available > 20	
	0.9	What is the amount of everall observations?			/wailable / 20	
	00	What is the amount of mission data points?				
	010	format is the amount of missing data points : Are data points missing in periods? (If you, plance state above state promotion numbers for missing periods)				
-	011	Pre data points missing in periods ? (in yes, please state observation numbers for missing periods).				
Ded	n Morif	Insinerio data time sequenced? (in no, please state now metric data is sequenced)	MILE 2			
Da	a vern Loss	international and the second of the second o	mor-a	F F		
	012	when is metric data recorded in the process r (at start, middle, end, later, etc.)			Xee	
	014	is all metric data recorded at the same place in the process (at start, middle, end, later, etc.)			Tes	
	014	who is responsible for recording metric data?			Xee	
	018	is all metric data recorded by the responsible body ?			Tes	
-	017	How is metric data recorded? (on a form, report, tool, etc.)			X	
	U17	is all metric data recorded the same way? (on a form, report, tool, etc.)			res	
-	010	Where is metric data stored? (in a file, database, etc.)			V	
-	Tu ia	Is all metric data stored in the same place? (in a file, database, etc.)	NUE 4	- r	res	
Da	a uepe	noability	MUF-4	F		
	020	What is the frequency of generating metric data? (asynchronously, daily, weekly, monthly, etc.)				
	021	What is the frequency of recording metric data? (asynchronously, daily, weekly, monthly, etc.)				
	022	What is the frequency of storing metric data? (asynchronously, daily, weekly, monthly, etc.)				
	023	Are the frequencies for data generation, recording, and storing different?			No	
	024	Is metric data recorded precisely?			Yes	
	026	Is metric data collected for a specific purpose?			Yes	
	Q26	Is the purpose of metric data collection known by process performers?			Yes	
	Q27	Is metric data analyzed and reported?			Yes	
	Q28	Is metric data analysis results communicated to process performers?			Yes	
	Q29	Is metric data analysis results communicated to management?			Yes	
	030	Is metric data analysis results used as a basis for decision making?			Yes	
Dat	a Norn	nalizability				
	031	Can metric data be normalized by parameters or metrics? (If yes, please specify them)				
Dat	a Integ	rability				
	032	Is metric data integrable at project level?				
	033	Is metric data integrable at organization level?				

Metric Name:		
Conceptual Definition:		
Assessed On:		
Assessed By:		
Metric Usability Attributes	Rating	Expected Rating
Metric Identity (MUA-1)	F	F
Data Existence (MUA-2)	F	F
Data Verifiability (MUA-3)	F	LorF
Data Dependability (MUA-4)	F	LorF
Metric Usability Result	U	L or F (Usable) Not Usable otherwise

Figure 4 Metric Usability Questionnaire for Base Metrics

			Please rate each attribute in four scales, based on asnw	ers to qu	astions as indicators:
Me	tric Na	me:	F : Indications of the atribute are fully satisfied (%86-1	00)	
Co	nceptu	al Definition:	L : Indications of the atribute are largely satisfied (%5'	1-85)	
As	sesse	d On:	P : Indications of the atribute are largely satisfied (%16	3-50)	
As	sesse	i By:	N : Indicatiors of the atribute are not satisfied (%0-15))	
At	ribute	3	Answers	Rating	Expected Answers
	Indicat	ors			
Me	tric Ide	entity	MUF-1	F	
	Q1	What is the the metric formula? (please refer to related base metrics)			
	Q2	What is the scale of the metric data? (nominal, ordinal, interval, ratio, absolute)			Ratio, Absolute
	Q3	What is the unit of the metric data?			
	Q4	What is the type of the metric data? (integer, real, etc.)			
	Q5	What is the range of the metric data?			
Dat	ta Exist	ence	MUF-2	F	
	Q6	Is metric data existent?			Available > 10
	Q7	What is the amount of overall observations?			
	Q8	What is the amount of missing data points?			
	Q9	Are data points missing in periods? (If yes, please state observation numbers for missing periods)			
	Q10	Is metric data time sequenced? (If no, please state how metric data is sequenced)			
Dat	ta Verit	iability	MUF-3	F	
	Q11	How is metric data calculated? (by a tool, manually, etc.)			
	Q12	Is all metric data calculated the same way? (by a tool, manually, etc.)			Yes
	Q13	Is all metric data calculated according to metric formula?			Yes
	Q14	Where is metric data stored? (in a file, database, etc.)			
	Q15	Is all metric data stored in the same place? (in a file, database, etc.)			Yes
Dat	ta Depe	ndability	MUF-4	F	
	Q16	Is metric data stored precisely?			Yes
	Q17	Is metric data stored for a specific purpose?			Yes
	Q18	Is the purpose of metric data storage known by process performers?			Yes
	Q19	Is metric data analyzed and reported?			Yes
	Q20	Is metric data analysis results communicated to process performers?			Yes
	Q21	Is metric data analysis results communicated to management?			Yes
	Q22	Is metric data analysis results used as a basis for decision making?			Yes
Da	ta Norn	nalizability			
	Q23	Can metric data be normalized by parameters or metrics? (If yes, please specify them)			
Da	ta Integ	rability			
	Q24	Is metric data integrable at project level?			
	Q25	Is metric data integrable at organization level?			

Metric Name:		
Conceptual Definition:		
Assessed On:		
Assessed By:		
Metric Usability Attributes	Rating	Expected Rating
Metric Identity (MUF-1)	F	F
Data Existence (MUF-2)	F	F
Data Verifiability (MUF-3)	F	LorF
Data Dependability (MUF-4)	F	L or F
MUF-3&4 for base metric-1		LorF
MUF-3&4 for base metric-2		L or F
MUF-3&4 for base metric-n		L or F
Metric Usability Result	U	L or F (Usable) Not Usable otherwise

Figure 5 Metric Usability Questionnaire for Derived Metrics

B. DETAILS OF CASE STUDIES A, B

SPC-AM Assets

Process Execution Records of Case Study A

👙 SPC - AAT	
Workspace Assessment Proces	s Improvement Help
	<u>2</u>
PROCESS DATA	M ASSESSMENT
Process Executions O Metric I	Data
Process Execution Records 1 25.M. C.AL ν 2 25.M. C.AL ν 3 25.M. C.AL ν 4 26.M. C.AL ν 5 25.M. C.AL ν 6 25.M. C.AL ν 8 25.M. C.AL ν 9 25.M. C.AL ν 9 25.M. C.AL ν 10 25.M. C.AL ν 11 25.M. C.AL ν 12 25.M. C.AL ν 12 25.M. C.AL ν 12 25.M. C.AL ν 12 25.M. C.AL ν 12 25.M. C.AL ν 12 25.M. C.AL ν 12 25.M. C.AL ν 13 25.M. C.AL ν 15 25.M. C.AL ν 15 25.M. C.AL ν 15 25.M. C.AL ν 15 25.M. C.AL. ν 16 25.M. C.AL. ν 17 25.M. C.AL. ν 18 25.M. C.AL. ν	Process Execution Record Detail Record Info Inputs Outputs Activities Roles Tools & Techniques Process Execution No: [

Figure 6 Process Execution Record of Process Execution #1

👙 SPC - AAT			
Workspace Assessment Process	Improvement Help		
	D 🛃 💡		
PROCESS DATA	M ASSESSMENT	PROCESS	5 IMPROVEMENT
Process Executions Metric D	ata		
Process Execution Records	Process Execution Record Detail		
PrRecoRecoSele	Record Info Inputs Outputs	Activities Roles Tools &	Techniques
1 25.M. C.AL	No	Nomo	Description
2 25.M. C.AL.	1	SRS	Software Requirements Specific
4 25.MC.AL 🗹	2	STC	Software Test Case Document
5 25.M C.AL 🗹 📥	3	UC NODE	Use Case Excel Sheet - NODE
6 25.MC.AL	-		
8 25.M. C.AL.			
9 25.M C.AL 💌 🔒			
10 25.M. C.AL.			
12 25 M C AL			
13 25.M. C.AL.			
14 25.M C.AL 🔽			
15 25.M. C.AL.			
17 25 M C AL	<u>µ</u>		
18 25.M C.AL 🗹			Save Execution Record

Figure 7 Process Execution Record of Process Execution #1

🐓 SPC - AAT Morksnara Assassment Drocas	es Improvement Help			
PROCESS DATA	ASSESSMENT	🌔 PR	OCESS IMPROVEMENT	
Process Executions O Metric	Data			
Process Execution Records	Process Execution Record Detail Record Info Inputs Output	ts Activities Roles T	Tools & Techniques	
1 25 M. O.A ✓ 2 25 M. O.A ✓ 3 25 M. O.A ✓ 4 25 M. O.A ✓ 6 25 M. O.A ✓ 7 25 M. O.A ✓ 9 25 M. O.A ✓ 10 25 M. O.A ✓ 9 25 M. O.A ✓ 11 25 M. O.A ✓ 12 25 M. O.A ✓ 13 25 M. O.A ✓ 14 25 M. O.A ✓ 15 25 M. O.A ✓ 16 25 M. O.A ✓ 17 25 M. O.A ✓ 18 25 M. O.A ✓ 18 25 M. O.A ✓	No 1 2	Name STC UC_NODE	Description Software Test Case Document Use Case Excel Sheet - NODE	

Figure 8 Process Execution Record of Process Execution #1

SPC - AAT Workspace Assessment Proces	s Improvement Hel	p						_ = ×
PROCESS DATA	M ASSI	ESSMENT		Ð	PROCESSI	MPROVEMEN	NT	
Process Executions O Metric Process Execution Records	Data	Record Detail						
PrRecoSele	Record Info Ir	nputs Outputs	Activities	Roles	Tools & T	lechniques]	
2 25 M. CAL. <i>μ</i> 3 25 M. CAL. <i>μ</i> 4 25 M. CAL. <i>μ</i> 5 25 M. CAL. <i>μ</i> 6 25 M. CAL. <i>μ</i> 7 25 M. CAL. <i>μ</i> 9 25 M. CAL. <i>μ</i> 10 26 M. CAL. <i>μ</i> 11 25 M. CAL. <i>μ</i> 12 26 M. CAL. <i>μ</i> 12 26 M. CAL. <i>μ</i> 12 26 M. CAL. <i>μ</i> 12 26 M. CAL. <i>μ</i> 12 26 M. CAL. <i>μ</i> 12 26 M. CAL. <i>μ</i> 12 26 M. CAL. <i>μ</i> 12 26 M. CAL. <i>μ</i> 15 26 M. CAL. <i>μ</i> 17 25 M. CAL. <i>μ</i>	N 2	0	N Run Test Case Save Test Resu	ame It		E Run Test Ca: Save Test Ré	bescription se isut	
18 25.M C.AL							Save Exect	tion Record

Figure 9 Process Execution Record of Process Execution #1

sPC - AAT Norkspace Assessment Pro	ess Improvement Help					[
	<u>></u>						
PROCESS DATA	M ASSES	SMENT		Ð	PROCESS IMPROVE	MENT	
● Process Executions ○ Met	c Data						
Process Execution Records	Process Execution R	ecord Detail	Activities	Roles	Tools & Technique	is l	
1 25 M 0 AL µ 2 25 M 0 AL µ 3 25 M 0 AL µ 4 25 M 0 AL µ 5 25 M 0 AL µ 6 25 M 0 AL µ 7 25 M 0 AL µ 9 25 M 0 AL µ 10 25 M 0 AL µ 12 25 M 0 AL µ 12 25 M 0 AL µ 12 25 M 0 AL µ 12 25 M 0 AL µ 13 25 M 0 AL µ 14 25 M 0 AL µ 15 25 M 0 AL µ	No 1	System Te	Name ester	1,2	Act_No F	Description lerforms System Testin	
17 25.M C.AL V 18 25.M C.AL V						Save Execution	Record

Figure 10 Process Execution Record of Process Execution #1

الله SPC - AAT		• 🗙
Workspace Assessment Proce	ss Improvement Help	
PROCESS DATA	M ASSESSMENT	
Process Executions O Metric	Data	
Process Execution Records	Process Execution Record Detail	
PrRecoRecoSele	Record Info Inputs Outputs Activities Roles Tools & Techniques	
2 25 M. C AL. V 3 25 M. C AL. V 4 25 M. C AL. V 5 25 M. C AL. V 6 25 M. C AL. V 8 25 M. C AL. V 8 25 M. C AL. V 8 25 M. C AL. V	Process Execution No: 2 Recorded On: 25.May.2007	
10 25.M C.AL	Recorded By: C.ALTUN	
11 25.MCAL V 12 25.MCAL V 13 25.MCAL V 14 25.MCAL V 15 25.MCAL V 16 25.MCAL V 17 25.MCAL V 18 25.MCAL V	Process Execution Questionnair Save Execution Rece	p>>

Figure 11 Process Execution Record of Process Execution #2

SPC - AAT	ss imnrovement Hein						(
		?						
PROCESS DATA	M ASSESS	MENT		Ð	PROCESS IMPR	OVEMEN	т	
Process Executions O Metric	Data							
Process Execution Records	Process Execution Re Record Info Input	cord Detail	Activities	Roles	Tools & Techr	niques		
1 25.M C.AL 2 25.M C.AL 3 25.M C.AL	No 1		SRS	Name	Softw	D vare Req	escription uirements Specific.	
4 25.M C.AL 🖌 5 25.M C.AL 🖌	2 3	1	UC_NODE BTC		Use (Softw	Case Exi vare Test	cel Sheet - NODE Case Document	
7 25.M C.AL 🗹 8 25.M C.AL 🗹 9 25.M. C.AL 🗹								
10 25.M C.AL 2								
12 20.M C.AL ♥ 13 25.M C.AL ♥ 14 25.M C.AL ♥								
15 25.MC.AL								•
18 25.M C.AL							Save Execution	Record

Figure 12 Process Execution Record of Process Execution #2

SPC - AAT Workspace Assessment Process	Simprovement Help			
PROCESS DATA Process Executions Metric D	M ASSESSMENT		PROCESS IMPROVEMENT	
Process Execution Records	Process Execution Record De	tail Itputs Activities Role	s Tools & Techniques	
1 25 M. C.A P 25 M. C.A P 3 25 M. C.A P 3 25 M. C.A P 4 25 M. C.A P 5 25 M. C.A P 6 25 M. C.A P 7 25 M. C.A P 8 25 M. C.A P 9 25 M. C.A P 10 25 M. C.A P 12 25 M. C.A P 12 25 M. C.A P 13 25 M. C.A P 16 25 M. C.A P 16 25 M. C.A P 17 25 M. C.A P	No 1 2	Name UC_NODE STC	Descri Use Case Excel SI Software Test Cas	ption heet-NODE e Document

Figure 13 Process Execution Record of Process Execution #2

SPC - AAT Workspace Assessment Process	s Improvement Help			
	🏂 婱			
PROCESS DATA	M ASSESSMENT	PROCESS	S IMPROVEMENT	
Process Executions Metric D Process Execution Records Pr. Reco. Reco. Sele	Data Process Execution Record Detail	Activities Roles Tracks	Techniques	
1 25.M., C.AL.,	No	Name	Description	
3 25.M C.AL 🖌	1	Save Test Result	Save Test Resut	
4 25.M. C.AL ℓ 5 25.M. C.AL ℓ 6 25.M. C.AL ℓ 8 25.M. C.AL ℓ 9 25.M. C.AL ℓ 10 25.M. C.AL ℓ 11 25.M. C.AL ℓ 13 25.M. C.AL ℓ 13 25.M. C.AL ℓ 14 25.M. C.AL ℓ 15 25.M. C.AL ℓ 16 25.M. C.AL ℓ 16 25.M. C.AL ℓ 17 25.M. C.AL ℓ 18 25.M. C.AL ℓ 18 25.M. C.AL ℓ 18 25.M. C.AL ℓ 18 25.M. C.AL ℓ 18 25.M. C.AL ℓ 18 25.M. C.AL ℓ 18 25.M. C.AL ℓ 18 25.M. C.AL ℓ 18 25.M. C.AL ℓ 18 25.M. C.AL ℓ 18 25.M. C.AL ℓ 19 25.M. C.AL ℓ 19 25.M. C.AL ℓ 10 25.M. C.AL		Run Test Case	Run Test Case	TRecord

Figure 14 Process Execution Record of Process Execution #2

SPC - AAT Workspace Assessment Proces	s Improvement Help	
PROCESS DATA	M ASSESSMENT	PROCESS IMPROVEMENT
Process Execution Records Pr. Reco. Reco. Sele 1 25 M C AL 𝒴 2 25 M. C AL 𝒴 4 25 M C AL 𝒴 5 25 M C AL 𝒴 6 25 M C AL 𝒴 9 25 M C AL 𝒴 9 25 M C AL 𝒴 10 26 M C AL 𝒴 11 25 M C AL 𝒴 12 25 M C AL 𝒴 13 25 M C AL 𝒴 13 25 M C AL 𝒴 13 25 M C AL 𝒴 15 25 M C AL 𝒴 15 25 M C AL 𝒴 15 25 M C AL 𝒴 15 25 M C AL 𝒴 16 25 M C AL 𝒴 17 25 M C AL 𝒴 18 25 M C AL 💵	Process Execution Record Detail Record Info Inputs Outputs Activit No Name Name 1 System Tester	Ies Roles Tools & Techniques

Figure 15 Process Execution Record of Process Execution #2

SPC - AAT Workspace Assessment Process	s Improvement Help				
	🏂 婱				
PROCESS DATA	M ASSESSMEN	NT	PROCESS IMPROV	/EMENT	
Process Executions Metric E	Jata				
Process Execution Records	Process Execution Record	d Detail Outputs Activities	Roles Tools & Techniq	ues	
1 25 M. C AL ℓ 2 C5 M. C AL ℓ 3 25 M. C AL ℓ 4 25 M. C AL ℓ 5 25 M. C AL ℓ 6 25 M. C AL ℓ 7 25 M. C AL ℓ 9 25 M. C AL ℓ 10 25 M. C AL ℓ 11 25 M. C AL ℓ 13 25 M. C AL ℓ 13 25 M. C AL ℓ 14 25 M. C AL ℓ 15 25 M. C AL ℓ 16 25 M. C AL ℓ 18 25 M. C AL ℓ 18 25 M. C AL ℓ		Name Internet Explorer Microsoft Word Microsoft Excel	Act_No 1 1 1	Description Web Browser Word Document Excel Sheet Save Execution	n Record

Figure 16 Process Execution Record of Process Execution #2

👙 SPC - AAT		
Workspace Assessment Proc	ess Improvement Help	
	<u> </u>	
PROCESS DATA	ASSESSMENT	PROCESS IMPROVEMENT
Process Executions O Metri	ic Data	
Process Execution Records	Process Execution Record Detail	
Pr. Raco. Reco. Sele. 1 26 M. G.AL. P 2 26 M. G.AL. P 3 26 M. G.AL. P 4 25 M. G.AL. P 5 25 M. G.AL. P 6 25 M. G.AL. P 8 26 M. G.AL. P 9 25 M. G.AL. P 8 25 M. G.AL. P 9 25 M. G.AL. P 10 25 M. G.AL. P 12 25 M. G.AL. P 12 25 M. G.AL. P 13 25 M. G.AL. P 15 25 M. G.AL. P 15 25 M. G.AL. P 15 25 M. G.AL. P 17 26 M. G.AL. P 18 26 M. G.AL. P 18 26 M. G.AL. P	Record Info Inputs Outputs Activities Process Execution No: 3 3 3 3 Recorded On: 25 May 2007 3 3 Recorded By: C ALTUN 3 3	Roles Tools & Techniques

Figure 17 Process Execution Record of Process Execution #3

SPC - AAT Workspace Assessment Process	Improvement Help			
	D 📚 💡			
PROCESS DATA	ASSESSMENT	PROCESS	IMPROVEMENT	
Process Executions O Metric Da	ata			
Process Execution Records	Process Execution Record Detail			
PrRecoRecoSele 1 25.MC.AL	Record Info Inputs Outputs	Activities Roles Tools &	Techniques	
2 25.M. C.AL.	No	Name	Description	C FII
4 25.M., C.AL.,	1	SR5	Lice Case Event Shoot, NODE	
5 25.M C.AL 🗹 🔺	2	STC	Software Test Case Document	<u>×</u>
b 25.m. C.A ℓ 7 25.M. C.A ℓ 8 25.M. C.A ℓ 10 25.M. C.A ℓ 11 25.M. C.A ℓ 12 25.M. C.A ℓ 13 25.M. C.A ℓ 14 25.M. C.A ℓ 15 25.M. C.A ℓ 16 25.M. C.A ℓ 18 25.M. C.A.			Save Execution Rec	vord

Figure 18 Process Execution Record of Process Execution #3

👙 SPC - AAT						
Workspace Assessment Process	mprovement Help					
PROCESS DATA	M ASSESSMENT	PROCI	ESS IMPROVEMENT			
Process Executions Metric Da Process Execution Records	Process Executions O Metric Data Process Execution Record Detail					
PrRecoRecoSele	Record Info Inputs Output	Activities Roles Tool	s & Techniques			
1 25.M C.AL	No	Name	Description			
3 25.M C.AL 🖌 본	1	UC_NODE	Use Case Excel Sheet - NODE			
4 25.M C.AL 🗹 🔼	2	STC	Software Test Case Document	×		
5 25.M. C.AL						
7 25.M., C.AL.,						
8 25.M C.AL 🗹 🚃						
9 25.M C.AL 🗹 🛃						
10 25.M. C.AL						
12 25 M C AL						
13 25.M C.AL 🗹						
14 25.M C.AL						
15 25.M C.AL 🗹						
16 25.MC.AL				-		
17 25.M. C.AL						
10 20.00 C.AL			Save Execution	Record		

Figure 19 Process Execution Record of Process Execution #3

SPC - AAT	ss Imnrovamant Haln			_ • •
PROCESS DATA	M ASSESSMENT	PROCES:	SIMPROVEMENT	
Process Executions Metric Process Execution Records PrRecoRecoSele	Data Process Execution Record Detail Record Info	Activities Roles Tools &	Techniques	
1 25.M C.AL 🗹 🛄 2 25.M C.AL 🗹	No	Name	Description	
3 25.M C.AL 🖌 본	1	Save Test Result	Save Test Resut	
4 25 M. CAL.	2	Run Test Case	Run Test Case	× tion Record

Figure 20 Process Execution Record of Process Execution #3

SPC - AAT Workspace Assessment Proces	s Improvement Help				- 0 🗙
	🈼 놀 💡				
PROCESS DATA	M ASSESSME	NT	PROCESS IMPR	OVEMENT	
Process Executions Metric I Process Execution Records Pr Record Sele Pr	Process Execution Recor	d Detail	Poles Tools & Tools	niques	
1 25 M. CA V 2 25 M. CA V 2 25 M. CA V 4 25 M. CA V 5 25 M. CA V 6 25 M. CA V 7 25 M. CA V 8 26 M. CA V 9 25 M. CA V 10 25 M. CA V 11 25 M. CA V 12 25 M. CA V 13 26 M. CA V 14 25 M. CA V 15 25 M. CA V 16 25 M. CA V 17 25 M. CA V 18 25 M. CA V		Name System Tester	Act No	Description Performs System Testin.	kecord

Figure 21 Process Execution Record of Process Execution #3

👙 SPC - AAT Workspace Assessment Process	s Improvement Help				
	🏂 놀 💡				
PROCESS DATA	M ASSESSMEN	٩T	PROCESS IMPRO	VEMENT	
Process Executions Metric D Process Execution Records	Process Executions O Metric Data Process Execution Record Detail				
PrRecoRecoSele	Record Info Inputs	Outputs Activities	Roles Tools & Techni	ques	
2 25 M. C.A (3 25 M. C.A (4 25 M. C.A (5 25 M. C.A (5 25 M. C.A (6 25 M. C.A (8 25 M. C.A (8 25 M. C.A (9 25 M. C.A (9 25 M. C.A (1 25 M. C.A (1 25 M. C.A (1 25 M. C.A (1 25 M. C.A (1 2 5 M. C.A (1 3 2 5 M. C.A (1 3 2 5 M. C.A (1 3 2 5 M. C.A (1 3 2 5 M. C.A (1 4 2 5 M. C.A (1 5 2 5	No 1 2 3	Name Internet Explorer Microsoft Vord Microsoft Excel	Act_No 1 1 1 1 1	Description Web Browser Word Document Excel Sheet	ion Record

Figure 22 Process Execution Record of Process Execution #3

👙 SPC - AAT		
Workspace Assessment Process Im	provement Help	
PROCESS DATA	M ASSESSMENT	PROCESS IMPROVEMENT
Process Executions O Metric Data		
Process Execution Records Pr	ocess Execution Record Detail	
Pr. Reco. Reco. Selo 1 25 M. O.AL 2 25 M. O.AL 3 25 M. O.AL 4 25 M. O.AL 5 25 M. O.AL 8 25 M. O.AL 8 25 M. O.AL 9 25 M. O.AL 8 25 M. O.AL 9 25 M. O.AL 9 25 M. O.AL 10 25 M. O.AL 11 25 M. O.AL 12 25 M. O.AL 12 25 M. O.AL 12 25 M. O.AL 12 25 M. O.AL 12 25 M. O.AL 12 25 M. O.AL 15 25 M. O.AL. 16 25 M. O.AL. 17 25 M. O.AL. 18 25 M. O.AL.	Record Info Inputs Outputs Activities 1 Process Execution No: 4 <	Roles Tools & Techniques

Figure 23 Process Execution Record of Process Execution #4

👙 SPC - AAT				
Workspace Assessment Proces	s Improvement Help			
	🏂 婱			
PROCESS DATA	ASSESSMENT	PROCES:	S IMPROVEMENT	
Process Executions O Metric	Data			
Process Execution Records	Process Execution Record Detail			
PrRecoRecoSele	Record Info Inputs Output	ts Activities Roles Tools &	& Techniques	
2 25.M C.AL 🗹 🌄	No	Name	Description	
3 25.M C.AL 🗹 🚨	1	SRS	Software Requirements Specific	
4 25.M. C.AL.	2	UC_NODE	Use Case Excel Sheet - NODE	×
6 25.M., C.AL.,	3	STC	Software Test Case Document	
7 25.M C.AL 🗹 💙				
8 25.M C.AL				
10 25 M CAL				
11 25.M C.AL 🗹				
12 25.M C.AL 🖌				
13 25.MC.AL				
15 25 M C AL				
16 25.M C.AL 🖌				-
17 25.M C.AL 🗹				
18 25.M C.AL			Save Execution R	ecord

Figure 24 Process Execution Record of Process Execution #4

👙 SPC - AAT		
Workspace Assessment Process	Improvement Help	
PROCESS DATA	M ASSESSMENT	PROCESS IMPROVEMENT
Process Executions Metric D Process Execution Records	ata Process Execution Record Detail	
PrRecoSele	Record Info Inputs Outputs Activ	ities Roles Tools & Techniques
1 25.MC.AL 🗹 2 25.MC.AL 🗹 3 25.MC.AL 🗹		Name Description
4 25.M. C.A ℓ 5 25.M. C.A ℓ 8 26.M. C.A ℓ 7 25.M. C.A ℓ 9 25.M. C.A ℓ 10 25.M. C.A ℓ 11 25.M. C.A ℓ 12 25.M. C.A ℓ 13 25.M. C.A ℓ 14 25.M. C.A ℓ 15 26.M. C.A ℓ 16 25.M. C.A ℓ 17 25.M. C.A ℓ	2 STC	Software Test Case Document
18 25.MC.AL		Save Execution Record

Figure 25 Process Execution Record of Process Execution #4

SPC - AAT Workspace Assessment Proces	is Improvement Help			
PROCESS DATA	M ASSESSMENT	PROCES	S IMPROVEMENT	
Process Executions OMetric Process Execution Records PrRecoRecoSele PrRecoRecoSele	Process Execution Record Detail Record Info Inputs Outputs	Activities Roles Tools	& Techniques	
1 25.M. C A V 2 25.M. C A V 3 25.M. C A V 5 25.M. C A V 6 25.M. C A V 7 25.M. C A V 8 26.M. C A V 9 25.M. C A V 10 25.M. C A V 11 25.M. C A V 12 25.M. C A V 13 25.M. C A V 14 25.M. C A V 15 25.M. C A V 16 25.M. C A V 18 25.M. C A V		Name Save Test Result Run Test Case	Description Save Test Resut Run Test Case Save Execut	ion Record

Figure 26 Process Execution Record of Process Execution #4

SPC - AAT	Improvement Help			
PROCESS DATA	M ASSESSMENT		PROCESS IMPROVE	MENT
Process Executions Metric Da	ata			
Process Execution Records	Process Execution Record D	etail Dutnuts Activities I	Roles Tools & Technique	21
1 25.M. ⊂ AL ⊭ 2 25.M. ⊂ AL ⊭ 3 25.M. ⊂ AL ⊭ 4 25.M. ⊂ AL ⊭ 6 25.M. ⊂ AL ⊭ 7 25.M. ⊂ AL ⊭ 8 25.M. ⊂ AL ⊭ 9 25.M. ⊂ AL ⊭ 9 25.M. ⊂ AL ⊭ 10 25.M. ⊂ AL ⊭ 11 25.M. ⊂ AL ⊭ 12 25.M. ⊂ AL ⊭ 13 25.M. ⊂ AL ⊭ 14 25.M. ⊂ AL ⊭ 15 25.M. ⊂ AL ⊭ 16 25.M. ⊂ AL ⊭ 16 25.M. ⊂ AL ⊭ 17 25.M. ⊂ AL ⊭		Name System Tester	Act_No	Description lefforms System Testin
18 25.MC.AL				Save Execution Record

Figure 27 Process Execution Record of Process Execution #4

👙 SPC - AAT					
PROCESS DATA	M ASSESSME	NT	PROCESS IMPRO	VEMENT	
Process Executions Metric Process Execution Records Pr. Reco Reco Sele	Data Process Execution Recor Record Info Inputs	d Detail	Roles Tools & Techni	ques	
1 25 M. CAL. ♥ 2 25 M. CAL. ♥ 3 25 M. CAL. ♥ 4 25 M. CAL. ♥ 5 25 M. CAL. ♥ 6 25 M. CAL. ♥ 7 25 M. CAL. ♥ 9 25 M. CAL. ♥ 10 25 M. CAL. ♥ 11 25 M. CAL. ♥ 12 25 M. CAL. ♥ 13 25 M. CAL. ♥ 14 25 M. CAL. ♥ 15 25 M. CAL. ♥	No 1 2 3	Name Internet Explorer Microsoft Word Microsoft Excel	Act_No 1 1 1	Description Web Browser Word Document Excel Sheet	
17 25.M., C.AL., V 18 25.M., C.AL., V				Save Executi	on Record

Figure 28 Process Execution Record of Process Execution #4

SPC - AAT	s Improvement Heln	
PROCESS DATA	ASSESSMENT	PROCESS IMPROVEMENT
Process Executions Metric Process Execution Records	Data	
Pr. Reco. Reco. Sele I 1 25.M. C AL V 3 25.M. C AL V 4 25.M. C AL V 5 25.M. C AL V 6 25.M. C AL V 8 25.M. C AL V 9 25.M. C AL V 10 25.M. C AL V 11 25.M. C AL V 12 25.M. C AL V 12 25.M. C AL V 12 25.M. C AL V 12 25.M. C AL V 12 25.M. C AL V 13 25.M. C AL V 14 25.M. C AL V 15 25.M. C AL V 18 25.M. C AL V 18 25.M. C AL V	Record Info Imputs Outputs Activities Roles Process Execution No: 5 Recorded On: 25 May 2007 Recorded By: C ALTUN	Tools & Techniques Tools & Techniques Process Execution Questionnaire> Save Execution Record

Figure 29 Process Execution Record of Process Execution #5

SPC - AAT Workspace Assessment Proces	ss Improvement Help		
	€ 🛃		
PROCESS DATA	M ASSESSMENT	PROCES	S IMPROVEMENT
Process Executions Metric Process Execution Records Pr Records Sele	Data Process Execution Record Detail Record Info	s Kinchattias K Balas K Taols.	8. Techniques
Image: Construction Construction 1 25 M., CAL., etc. 2 25 M., CAL., etc. 3 25 M., CAL., etc. 6 25 M., CAL., etc. 6 25 M., CAL., etc. 8 25 M., CAL., etc. 9 25 M., CAL., etc. 9 25 M., CAL., etc. 10 25 M., CAL., etc. 11 25 M., CAL., etc. 12 25 M., CAL., etc. 13 25 M., CAL., etc. 13 25 M., CAL., etc. 14 25 M., CAL., etc. 15 25 M., CAL., etc. 16 25 M., CAL., etc. 17 25 M., CAL., etc.	No 1 2 3	Name SRS UC_NODE STC	Software Requirements Specific Use Case Excel Sheet - NODE Software Test Case Document
18 25.MC.AL			Save Execution Record

Figure 30 Process Execution Record of Process Execution #5

SPC - AAT Workspace Assessment Proces	s Improvement Help			- 0 🔀
	5			
PROCESS DATA	ASSESSMENT	D r	PROCESS IMPROVEMENT	
Process Executions Metric I	Data	.u		
PrRecoReco Sele	Record Info Inputs Out	nuts Activities Roles	Tools & Techniques	
1 25 M. CAL. V 2 25 M. CAL. V 4 25 M. CAL. V 5 25 M. CAL. V 6 25 M. CAL. V 8 25 M. CAL. V 9 25 M. CAL. V 9 25 M. CAL. V 10 25 M. CAL. V 11 25 M. CAL. V 12 25 M. CAL. V 13 25 M. CAL. V 13 25 M. CAL. V 14 25 M. CAL. V 15 25 M. CAL. V 15 25 M. CAL. V 16 25 M. CAL. V 17 25 M. CAL. V 18 25 M. CAL. V 19 25 M. CAL. V 19 25 M. CAL. V 10 25 M. CAL. V 10 25 M. CAL. V 10 25 M. CAL. V 11 25 M. CAL. V 12 25 M. CAL. V 13 25 M. CAL. V 14 25 M. CAL. V 15 25 M. CAL. V 15 25 M. CAL. V	No 1 2	Name UC_NODE STC	Description Use Case Excel Sheet - NODE Software Test Case Documen	
17 25.M., C.AL., 🗹 18 25.M., C.AL., 🗹			Save Execution	on Record

Figure 31 Process Execution Record of Process Execution #5

👙 SPC - AAT	a human manta tala			
PROCESS DATA	M ASSESSMENT	PROCES	SS IMPROVEMENT	
Process Executions Metric E Process Execution Records Pr. Reco. Reco. Sele The second sele	Data Process Execution Record Detail Record Info	fictivities Poles Tools	& Techniques	
1 25.M. (CAL., V) 2 25.M. (CAL., V) 2 25.M. (CAL., V) 4 25.M. (CAL., V) 6 25.M. (CAL., V) 7 25.M. (CAL., V) 9 25.M. (CAL., V) 9 25.M. (CAL., V) 10 25.M. (CAL., V) 11 25.M. (CAL., V) 12 25.M. (CAL., V) 13 25.M. (CAL., V) 14 25.M. (CAL., V) 15 25.M. (CAL., V) 16 25.M. (CAL., V) 18 25.M. (CAL., V)	No I 2	Name Name Name Save Test Result Run Test Case	Save Execut	Ion Record

Figure 32 Process Execution Record of Process Execution #5

👙 SPC - AAT				
Workspace Assessment Process	s Improvement Help			
	ا کے 🔮]		
PROCESS DATA	M ASSESSMEN	NT	PROCESS IMPR	ROVEMENT
Process Executions Metric D Process Execution Records PrRecoRecoSele	Process Execution Record	l Detail Outputs Activities	Roles Tools & Tech	miques
1 25.MC.AL	No	Name	Act No	Description
3 25.MC.AL 🖌	1	System Tester	1	Performs System Testin
4 25.M. CAL ℓ 6 25.M. CAL ℓ 7 25.M. CAL ℓ 9 25.M. CAL ℓ 9 25.M. CAL ℓ 10 25.M. CAL ℓ 11 25.M. CAL ℓ 13 25.M. CAL ℓ 15 25.M. CAL ℓ 16 25.M. CAL ℓ 18 25.M. CAL ℓ				Save Execution Record

Figure 33 Process Execution Record of Process Execution #5

SPC - AAT	a luura amant Holy				
PROCESS DATA	M ASSESSME	NT	PROCESS IMPRO	VEMENT	
Process Executions Metric Process Execution Records Pr. Reco. Reco. Sele. Pr. Reco. Records Pr. Reco. Reco. Reco. Records Pr. Reco. Reco. Reco. Reco. Reco. Reco. Reco. Reco. Reco. Reco. Reco. Reco. Reco. Reco. Reco. R	Data Process Execution Recor Record Info Inputs	d Detail Outputs Activities	Roles Tools & Techni	ques	
25 M.: CAL. V 2 25 M.: CAL. V 3 25 M.: CAL. V 5 25 M.: CAL. V 6 25 M.: CAL. V 8 25 M.: CAL. V 9 25 M.: CAL. V 9 25 M.: CAL. V 10 25 M.: CAL. V 11 25 M.: CAL. V 12 25 M.: CAL. V 13 25 M.: CAL. V 14 25 M.: CAL. V	N0 1 2 3	Name Internet Explorer Microsoft Word Microsoft Excel	Act_No 1 1 1	Description Web Browser Word Document Excel Sheet	
16 25.MCAL V 17 25.MCAL V 18 25.MCAL V				Save Executi	on Record

Figure 34 Process Execution Record of Process Execution #5

👙 SPC - AAT		• 🗙
workspace Assessment Proces	ss improvement Heip	
PROCESS DATA	M ASSESSMENT	
Process Executions O Metric	Data	
Process Execution Records	Process Execution Record Detail	
Pr. Reco. Reco. Sele Image: Constraint of the selection of the s	Record Info Inputs Outputs Activities Roles Tools & Techniques Process Execution No: ©	>> rd

Figure 35 Process Execution Record of Process Execution #6

👙 SPC - AAT				- • •			
Workspace Assessment Process Improvement Help							
	2 🃚 🂡						
PROCESS DATA	M ASSESSMENT	PROCESS	S IMPROVEMENT				
Process Executions Metric I	Process Executions O Metric Data						
Process Execution Records	Process Execution Record Detail	Activities Roles Tools &	Technimues				
1 25.M C.AL 🖌 2 25.M C.AL 🖌 3 25.M. C.AL. 🖌	No	Name SRS	Description Software Requirements Specific				
4 25.M C.AL ⊮ 5 25.M C.AL ⊮	2	UC_NODE STC	Use Case Excel Sheet - NODE Software Test Case Document				
6 25.MC.AL		1					
9 25.M C.AL							
11 25.M C.AL 🗹 12 25.M C.AL 🗹 13 25.M C.AL							
14 25.M., C.AL., K 15 25.M., C.AL., K 16 25.M., C.AL., K				-			
17 25.M C.AL			Save Execution R	tecord			

Figure 36 Process Execution Record of Process Execution #6

👙 SPC	C - AAT										- • •
Works	Workspace Assessment Process Improvement Help										
P	PROCESS DATA		M A	SSESSME	NT		Ð	PROCESS	IMPROVEMEN	П	
● Pr	Process Executions O Metric Data Process Execution Record Detail										
Pr	Reco Reco Sel	le 🙀	Record Info	Innute	Outpute	Activities	Rolee	Toole 8	Tochniquos	1	
1	25.M C.AL		recordino	mpaco	Outputo	HCUVICCO	Tuica	10013 0	rechniques		
2	25.M C.AL			No			Name		D	escription	_ r• -
3	25.M C.AL		1			JC_NODE			Use Case Ex	cel Sheet - NODE	
4	25.M C.AL		2		4	BTC			Software Tes	t Case Document	×
5	25.MC.AL	4 🛋 🗌									
7	25.M. C.AL.										
8	25.M C AL										
9	25 M C AL										
10	25.M. C.AL.	- 💾 🛛									
11	25.MC.AL										
12	25.M C.AL										
13	25.M C.AL										
14	25.M C.AL										
15	25.M C.AL										
16	25.MC.AL		<u> </u>								-
17	25.MC.AL										
18	25.MC.AL									Save Execution	Record

Figure 37 Process Execution Record of Process Execution #6

SPC - AAT Workspace Assessment Process	s Improvement Help		
	2 🛃		
PROCESS DATA	ASSESSMENT	PROCESS	IMPROVEMENT
Process Executions Metric E Process Execution Records	hata - Process Execution Record Detail		
PrRecoRecoSele	Record Info Inputs Outputs	Activities Roles Tools 8	Techniques
2 25.M C.AL 🗹 💽	No	Name	Description
3 25.M. C.AL.	1	Save Test Result	Save Test Resut
5 25.MC.AL	2	Run Test Case	Save Test Result to STC and UC
6 25.M C.AL	3	Create Test Package	
7 25.MC.AL			
9 25.M C.AL 🖌 🏄			
10 25.M C.AL 🗹 🧮			
11 25.M. CAL			
13 25.M. C.AL.			
14 25.M C.AL 🖌			
15 25.M. C.AL			
17 25.M., C.AL.,			
18 25.M C.AL 🗹			Save Execution Record

Figure 38 Process Execution Record of Process Execution #6

SPC - AAT Workspace Assessment Process	Improvement Help			
	D 🛃 📀			
PROCESS DATA	M ASSESSME	NT	PROCESS IMPRO	VEMENT
Process Executions O Metric Data	ata			
Process Execution Records	Process Execution Record	d Detail		
PrRecoRecoSele	Record Info Inputs	Outputs Activities	Roles Tools & Techni	iques
1 25.M C.AL 🗹 🚞	No	Name	Act_No	Description 📑 📥
3 25.MC.AL	1	System Tester	1	Performs System Testin
5 25.M C.AL				
6 25.M., C.AL., V				
8 25.M C.AL				
9 25.MC.AL				
11 25.M C.AL 🗹				
12 25.MC.AL				
14 25.M C.AL 🖌				
15 25.MC.AL				-
17 25.M C.AL				
18 25.M C.AL				Save Execution Record

Figure 39 Process Execution Record of Process Execution #6
👙 SPC - AAT Workspace Assessment Proce	ss Improvement Help				- 0 🔀
	🈼 놀 💡				
PROCESS DATA	M ASSESSME	NT	PROCESS IMPRO	VEMENT	
Process Executions Metric Process Execution Records Pr. Reco., Reco., Sele., []	Data Process Execution Recon Record Info	l Detail	Roles Tools & Techn	mies	
1 25 M. ⊂ AL ✓ 2 5 M. ⊂ AL ✓ ✓ 3 25 M. ⊂ AL ✓ 4 25 M. ⊂ AL ✓ 5 25 M. ⊂ AL ✓ 6 25 M. ⊂ AL ✓ 7 25 M. ⊂ AL ✓ 8 25 M. ⊂ AL ✓ 9 25 M. ⊂ AL ✓ 9 25 M. ⊂ AL ✓ 10 25 M. ⊂ AL ✓ 11 25 M. ⊂ AL ✓ 12 25 M. ⊂ AL ✓ 13 25 M. ⊂ AL ✓ 14 25 M. ⊂ AL ✓ 16 25 M. ⊂ AL ✓ 16 25 M. ⊂ AL ✓ 16 25 M. ⊂ AL ✓ 16 25 M. ⊂ AL ✓ 16 25 M. ⊂ AL ✓ 16 25 M. ⊂ AL ✓ 16 25 M. ⊂ AL ✓ 16 25 M. ⊂ AL ✓ 16 25 M. ⊂ CAL ✓	No 1 2 3 4	Name Internet Explorer Microsoft Word Microsoft Excel CA Harvest	Act_No Act_No 1 1 3 3	Description Web Browser Word Document Excel Sheet Configuration Managem	ecord

Figure 40 Process Execution Record of Process Execution #6

SPC - AAT	
workspace Assessment Proce	ss inprovement ricip
PROCESS DATA	M ASSESSMENT
Process Executions O Metric	Data
Process Execution Records	Process Execution Record Detail
Pr. Reco. Sete 12 SM. CA Image: CA	Record Info Inputs Outputs Activities Tools & Techniques Process Execution No: 7 7 7 Recorded On: 25 May 2007 7 7 Recorded By: C ALTUN 7 7 Process Execution Questionnaire>> 8ave Execution Questionnaire>> 8ave Execution Record

Figure 41 Process Execution Record of Process Execution #7

SPC - AAT Workspace Assessment Proce	ss Improvement Help			
PROCESS DATA Process Executions Metric Creases Execution Resards	M ASSESSMENT	PROCESS	SIMPROVEMENT	
Process checkloon recoulds PrRecoRecoSele 1 25.MCAL 2 25.MCAL 3 25.MCAL	Record info inputs Outputs	Activities Roles Tools &	Techniques Description Software Requirements Specific	
A 25 M. CAL. P CAL. P C 25 M. CAL. P 25 M. CAL. P 25 M. CAL. P 25 M. CAL. P 10 25 M. CAL. P 11 25 M. CAL. P 11 25 M. CAL. P	2 3	UC_NODE STC	Use Case Excel Sheet - NODE Software Test Case Document	
13 25 M C AL r/ 14 25 M C AL r/ 15 25 M C AL r/ 16 25 M C AL r/ 17 25 M C AL r/ 18 25 M C AL r/			Save Execution R	ecord

Figure 42 Process Execution Record of Process Execution #7

SPC - AAT	Improvement Help		[- • ×
PROCESS DATA	M ASSESSMENT	PROCES:	S IMPROVEMENT	
Process Executions O Metric D:	ata			
Process Execution Records	Process Execution Record Detail			
PrRecoSele	Record Info Inputs Output	s Activities Roles Tools &	k Techniques	
1 25.M. C.AL	No	Name	Description	
3 25.M C.AL 🗹 🚨	1	UC_NODE	Use Case Excel Sheet - NODE	
4 25.M C.AL 🗹 🔼	2	STC	Software Test Case Document	
5 25.M. C.AL.				
7 25.M., C.AL.,				
8 25.M C.AL 🗹				
9 25.M C.AL 🗹 🛃				
10 25.MC.AL				
12 25 M C AL				
13 25.MC.AL				
14 25.M C.AL 🖌				
15 25.M C.AL 🗹				
16 25.M. C.AL				-
17 25.M C.AL M				D
TO LOOM OTHER			Save Execution	Record

Figure 43 Process Execution Record of Process Execution #7

త్రీ SPC - AAT				
Workspace Assessment Process	improvement Help			
PROCESS DATA	M ASSESSMENT	PROCE	ESS IMPROVEMENT	
Process Executions Metric D Process Execution Records	ata			
PrRecoRecoSele	Record Info Inputs Outputs	Activities Roles Tool	s & Techniques	
1 25.M. C.AL. V 2 25.M. C.AL. V 3 25.M. C.AL. V	No 1	Name Save Test Result	Description Save Test Resut	
5 25 M., CA ν 6 25 M., CA ν 7 25 M. CA ν 8 25 M. CA ν 9 25 M. CA ν 10 25 M. CA ν 11 25 M. CA ν 11 25 M. CA ν	2	Run Test Case	Run rest Case	=
13 25 M C AL V 14 25 M C AL V 15 25 M C AL V 16 25 M C AL V 17 25 M C AL V 18 25 M C AL V			Save Exect	tion Record

Figure 44 Process Execution Record of Process Execution #7

SPC - AAT	Improvement Holp			
PROCESS DATA	M ASSESSMEN	٩T	PROCESS IMPROV	/EMENT
Process Executions Metric Da	ita	(D-f-il		
Process Execution Records	Process Execution Record	i Detail	V	
PrRecoRecosele 1 25.MC.AL 2 25.MC.AI	Record Info Inputs	Outputs Activities	Roles Tools & Techniq	Description
3 25.M C.AL 🖌	1	System Tester	1	Performs System Testin
4 25.M. CAL ℓ 6 25.M. CAL ℓ 8 25.M. CAL ℓ 8 25.M. CAL ℓ 9 25.M. CAL ℓ 10 25.M. CAL ℓ 11 25.M. CAL ℓ 12 25.M. CAL ℓ 13 25.M. CAL ℓ 15 25.M. CAL ℓ 15 25.M. CAL ℓ 16 25.M. CAL ℓ 17 25.M. CAL ℓ 17 25.M. CAL ℓ 17 25.M. CAL ℓ 18 25.M. CAL ℓ 19 25.M. CAL ℓ 19 25.M. CAL ℓ 10 25.M. CAL ℓ				Save Execution Record
				Save Execution Record

Figure 45 Process Execution Record of Process Execution #7

SPC - AAT Workspace Assessment Proces	ss Improvement Help					- • •
	<u></u>					
PROCESS DATA	M ASSESSME	NT	D PF	ROCESS IMPROVEMI	INT	
Process Executions Metric Process Execution Records PrRecoRecoSele	Data Process Execution Record Record Info	d Detail	Roles	Tools & Techniques	1]
2 S M. C AL. W 2 S M. C AL W 3 Z M. C AL W 4 Z S M. C AL W 5 Z M. C AL W 5 Z M. C AL W 6 Z S M. C AL W 7 Z S M. C AL W 8 Z S M. C AL W 9 Z S M. C AL W 10 Z S M. C AL W 11 Z S M. C AL W 12 Z S M. C AL W 13 Z S M. C AL W 14 Z S M. C AL W 15 Z S M. C AL W 16 Z S M. C AL W 17 Z S M. C AL W 18 Z S M. C AL W	No 1 2 3	Name Internet Explorer Microsoft Word Microsoft Excel	1 1 1	Act_No Ket	Description b Browser rd Document rel Sheet	

Figure 46 Process Execution Record of Process Execution #7

👙 SPC - AAT		
Workspace Assessment Process	Improvement Help	
PROCESS DATA	M ASSESSMENT	PROCESS IMPROVEMENT
Process Executions Metric Da	ata	
Process Execution Records	Process Execution Record Detail	
Pr. Reco. Reco. Sele. 1 25.M. CAL ¢ 3 25.M. CAL ¢ 4 25.M. CAL ¢ 5 6 25.M. CAL ¢ 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	Record Info Inputs Outputs Activities 1 Process Execution No: 0 Recorded On: 25 May 2007 Recorded By: C ALTUN	Roles Tools & Techniques

Figure 47 Process Execution Record of Process Execution #8

SPC - AAT Workspace Assessment Proces	ss Improvement Help			
	🏂 楶			
PROCESS DATA	M ASSESSMENT	PROCESS	S IMPROVEMENT	
Process Executions O Metric	Data			
Process Execution Records	Process Execution Record Detail	Vastistian V Dalan V Taola 8	Tashuimes	
1 26 M. CAL. # 26 M. CAL. # 2 26 M. CAL. # 3 26 M. CAL. # 4 22 M. CAL. # 5 26 M. CAL. # 6 26 M. CAL. # 7 26 M. CAL. # 7 26 M. CAL. # 9 26 M. CAL. # 10 26 M. CAL. # 11 26 M. CAL. # 11 26 M. CAL. # 11 26 M. CAL. #	No 1 2 3	Name SRS UC_NODE STC	Description Software Requirements Specific Use Case Excel Sheet - NODE Software Test Case Document	
14 25.M C AL V 15 25.M C AL V 16 25.M C AL V 17 25.M C AL V 18 25.M C AL V			Save Execution Rec	cord

Figure 48 Process Execution Record of Process Execution #8

👙 SPC - AAT				
Workspace Assessment Process	Improvement Help			
	2			
PROCESS DATA	M ASSESSMENT	PROC	ESS IMPROVEMENT	
Process Executions Metric Da Process Execution Records	ta Process Execution Record Detail—			
PrRecoRecoSele	Record Info Inputs Outputs	Activities Roles Too	ls & Techniques	
1 25.MC.AL	No	Name	Description	
3 25.M C.AL 🗾 본	1	UC_NODE	Use Case Excel Sheet - NO	DE 📙
4 25.M C.AL	2	STC	Software Test Case Docum	ent
5 25.M. C.AL.				
7 25.MC.AL 🗹 🔻				
8 25.M C.AL 🖌				
9 25.MC.AL 🗹 😤				
10 25.MC.AL				
12 25.M., C.AL.,				
13 25.M C.AL 🗹				
14 25.M C.AL 🖌				
15 25.M C.AL				
16 25.M. C.AL				
17 20.m. U.AL				r. D I
1.0 Jacob 1997 co Sel et Marco Le			Save Exect	nion Record

Figure 49 Process Execution Record of Process Execution #8

👙 SPC - AAT				
Workspace Assessment Process	s Improvement Help			
	🏂 楶			
PROCESS DATA	M ASSESSMENT	PROCESS	MPROVEMENT	
Process Executions O Metric D	Pata			
Process Execution Records	Process Execution Record Detail	V		
1 25.M., C.AL.,	Record Info Inputs Outputs	Activities Roles Tools 8	Techniques	
2 25.M C.AL 🗹 🏹	No	Name	Description	
3 25.M C.AL 🗹	1	Save Test Result	Save Test Resut	
4 25.M C.AL	2	Run Test Case	Run Test Case	×
6 25.M., C.AL.,	3	Create Test Package		
7 25.M C.AL 🗹 🔻				
8 25.M. C.AL				
10 25.M. C.AL.				
11 25.M C.AL 🗹				
12 25.M C.AL 💌				
13 25.M. C.AL.				
15 25.M., C.AL.,				
16 25.M C.AL 🖌				-
17 25.M C.AL				
18 Z5.M C.AL			Save Execution	on Record
L'				

Figure 50 Process Execution Record of Process Execution #8

Medanian Assessment Dec				
Workspace Assessment Pro	ess improvement Help			
PROCESS DATA	M ASSESSMEN	NT	PROCESS IMPROVE	AENT
Process Executions Met Process Execution Records Pr Reco. Reco. Sele	Process Execution Record	d Detail	Roles Tools & Tochninus	e]
1 25 M C.AL # 2 25 M C.AL # 3 25 M C.AL # 4 26 M C.AL # 5 25 M C.AL # 6 26 M C.AL # 7 25 M C.AL # 8 26 M C.AL # 9 26 M C.AL # 10 25 M C.AL # 12 25 M C.AL # 13 25 M C.AL # 14 25 M C.AL # 15 25 M C.AL # 14 25 M C.AL # 15 25 M C.AL # 16 25 M C.AL # 17 25 M C.AL # 18 25 M C.AL # 19 25 M C.AL #		System Tester	Act_No	Save Execution Record

Figure 51 Process Execution Record of Process Execution #8

SPC - AAT	a huura muont I lalu					- • •
PROCESS DATA	M ASSESSMEN	٩T	PRO	CESS IMPROVEME	٩T	
Process Executions Metric I Process Execution Records PrRecoRecoSele Y	Data Process Execution Record Record Info Inputs	l Detail Outputs Activities	Roles To	ols & Techniques	1	
1 25 M. C A.L. V 2 25 M. C A.L. V 3 25 M. C A.L. V 4 25 M. C A.L. V 5 25 M. C A.L. V 6 25 M. C A.L. V 7 25 M. C A.L. V 9 25 M. C A.L. V 9 25 M. C A.L. V 10 25 M. C A.L. V 11 25 M. C A.L. V 12 25 M. C A.L. V 13 25 M. C A.L. V 14 25 M. C A.L. V 15 25 M. C A.L. V 16 25 M. C A.L. V 17 25 M. C A.L. V 18 25 M. C A.L. V	No 1 2 3 4	Name Internet Explorer Microsoft Word Microsoft Excel CA Harvest	Ac 1 1 1 3	t_No Wet Wor Exce Con	Description Browser d Document i Scheet figuration Managem	

Figure 52 Process Execution Record of Process Execution #8

👙 SPC - AAT		
Workspace Assessment Process Imp	provement Help	
PROCESS DATA	M ASSESSMENT	PROCESS IMPROVEMENT
Process Executions Metric Data Process Execution Records Process Execution Records	ncaes Execution Bacard Datail	
P1000555 Execution rectors P1 Rec0. Sele. 2 25 M. CAL. 2 25 M. CAL. 2 25 M. CAL. 2 25 M. CAL. 2 25 M. CAL. 2 25 M. CAL. 2 25 M. CAL. 2 25 M. CAL. 2 25 M. CAL. 2 25 M. CAL. 8 25 M. CAL. 9 25 M. CAL. 9 25 M. CAL. 9 25 M. CAL. 9 25 M. CAL. 9 25 M. CAL. 10 25 M. CAL. 11 25 M. CAL. 12 25 M. CAL. 12 25 M. CAL. 12 25 M. CAL. 12 25 M. CAL. 12 25 M. CAL. 12 25 M. CAL. 12 25 M. CAL. 12 25 M. CAL. 12 25 M. CAL. 12 25 M. CAL. 12 25 M. CAL. 12 25 M. CAL. 12 25 M. CAL. 12 25 M. CAL. 12 25 M. CAL. 12 25 M. CAL. 12 25 M. CAL. 12 25 M. CAL. 12 25 M. CAL.	Record Info Inputs Outputs Activities 1 rocess Execution No: 9 ecorded On: 25.May.2007 ecorded By: CALTUN	Roles Tools & Techniques

Figure 53 Process Execution Record of Process Execution #9

SPC - AAT Workspace Assessment Proce	ss Improvement Help			- • •
	🏂 🎅			
PROCESS DATA	M ASSESSMENT	PROCESS	SIMPROVEMENT	
Process Executions Metric	Data			
Process Execution Records	Process Execution Record Detail		Tashuimas	
1 25 M. CAL. <i>v</i> 2 25 M. CAL. <i>v</i> 3 25 M. CAL. <i>v</i> 4 25 M. CAL. <i>v</i> 5 26 M. CAL. <i>v</i> 6 26 M. CAL. <i>v</i> 8 25 M. CAL. <i>v</i> 8 25 M. CAL. <i>v</i> 9 25 M. CAL. <i>v</i> 10 25 M. CAL. <i>v</i> 11 25 M. CAL. <i>v</i> 12 25 M. CAL. <i>v</i> 12 25 M. CAL. <i>v</i> 12 25 M. CAL. <i>v</i> 13 25 M. CAL. <i>v</i> 15 26 M. CAL. <i>v</i> 15 26 M. CAL. <i>v</i> 15 26 M. CAL. <i>v</i> 16 26 M. CAL. <i>v</i> 16 26 M. CAL. <i>v</i> 17 7 26 K. CAL. <i>v</i> 18 26 M. CAL. <i>v</i> 19 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL. <i>v</i> 10 26 M. CAL	No 1 2 3	Name SRS UC_NODE STC	Description Software Requirements Specific Use Case Excel Sheet - NODE Software Test Case Document	
17 [25.MC.AL			Save Execution R	ecord

Figure 54 Process Execution Record of Process Execution #9

👙 SP	C - AAT										
Work	space Assessm	ent Process	Improvement	Help							
			b	\bigcirc							
F	PROCESS DATA		M A	SSESSME	NT		Ð	PROCESS	IMPROVEMEN	П	
● Pi	rocess Executions ocess Execution Re	: O Metric D	ata Process Execut	tion Record	d Detail						
Pr.	Reco. Reco. Sel	le 💊	Record Info	Innuts	Outputs	Activities	Roles	Tools &	Techniques	1	
1	25.M C.AL						1	1			
2	25.M C.AL			No			Name		D	escription	_ 📌 🗖 🗌
3	25.M C.AL		1			JC_NODE			Use Case Ex	cel Sheet - NODE	
4	25.M. C.AL		2		-	втс			Software Tes	t Case Document	×
6	25.M. C.AL.										
7	25.M. C.&L										
8	25 M C AL										
9	25.M. C.AL.	e e e e e e e e e e e e e e e e e e e									
10	25.M C.AL										-
11	25.M C.AL										
12	25.M C.AL										
13	25.M C.AL										
14	25.M C.AL										
15	25.M C.AL										
16	25.M C.AL		<u> </u>								-
17	25.MC.AL	4									
18	25.MC.AL									Save Execution	Record

Figure 55 Process Execution Record of Process Execution #9

SPC - AAT Workspace Assessment Proces	s Improvement Help			
PROCESS DATA	M ASSESSMENT	PROCESS	S IMPROVEMENT	
Process Executions Metric Process Execution Records Pr Records Process Execution Records	Data	Vactivition V Dolon V Toolo 1	2 Tooloniuuso	
1 25 M. C AL. ♥ 2 25 M. C AL. ♥ 4 25 M. C AL. ♥ 5 25 M. C AL. ♥ 6 25 M. C AL. ♥ 8 25 M. C AL. ♥ 9 25 M. C AL. ♥ 9 25 M. C AL. ♥	No 1 2 3	Activities Rules Touls of Name Save Test Result Run Test Case Create Test Package	k recrinques Description Save Test Resut Run Test Case	
9 23 m A.L. V 10 25 m A.L. V 11 25 m A.L. V 13 25 m A.L. V 13 25 m A.L. V 14 25 m A.L. V 15 25 m A.L. V 15 25 m A.L. V 16 25 m A.L. V 18 25 m A.L. V 18 25 m A.L. V	<u></u>		Save Execut	- v

Figure 56 Process Execution Record of Process Execution #9

SPC - AAT	improvement Help			
PROCESS DATA	M ASSESSMEN	NT	PROCESS IMPROV	EMENT
Process Executions Metric D	ata	I Datail		
PrRecoRecoSele	Record Info Inputs	Outputs Activities	Roles Tools & Techniqu	Ies
1 20.m., 0 CAL., ℓ 2 25.M., CAL., ℓ 3 25.M., CAL., ℓ 4 25.M., CAL., ℓ 5 25.M., CAL., ℓ 6 25.M., CAL., ℓ 9 25.M., CAL., ℓ 9 25.M., CAL., ℓ 10 25.M., CAL., ℓ 12 25.M., CAL., ℓ 13 25.M., CAL., ℓ 14 25.M., CAL., ℓ 15 25.M., CAL., ℓ 16 25.M., CAL., ℓ 17 25.M., CAL., ℓ 18 25.M., CAL., ℓ	1 1	Name System Tester	Act No	Description Performs System Testin.

Figure 57 Process Execution Record of Process Execution #9

👙 SPC - AAT				(- 0 🔀
Workspace Assessment Proces	s Improvement Help				
	🏂 놀 💡				
PROCESS DATA	M ASSESSME	INT	PROCESS IMPR	OVEMENT	
Process Executions O Metric	Data				
Process Execution Records	Process Execution Recor	d Detail			
PrRecoSele	Record Info Inputs	Outputs Activities	Roles Tools & Techr	niques	
2 25.M., C.AL.,	No	Name	Act No	Description	
3 25.M C.AL 🗹 👗	1	Internet Explorer	1	Web Browser	
4 25.M C.AL 🗹 🔼	2	Microsoft Word	1	Word Document	×
6 25.MC.AL	3	Microsoft Excel	1	Excel Sheet	
7 25.MC.AL	4	CA Harvest	3	Configuration Managem	
8 25.M C.AL 🗹 🛁					
9 25.M. C.AL ₽ 2+					
11 25 M. CAL.					
12 25.M C.AL 🖌					
13 25.M C.AL					
14 25.MCAL					
16 25.MC.AL					-
17 25.M C.AL					
18 25.M C.AL				Save Execution	Record

Figure 58 Process Execution Record of Process Execution #9

👙 SPC - AAT		x
Workspace Assessment Proces	s Improvement Help	
PROCESS DATA	M ASSESSMENT	
Process Executions O Metric	Data	
Process Execution Records	Process Execution Record Detail	
Pr Reco. Reco. Sele. Image: Constraint of the selection of the sele	Record Info Inputs Outputs Activities Roles Tools & Techniques Process Execution No: 10 Recorded On: 26 May.2007 Image: California and Californi and California an]]
17 25.M CAL V 18 25.M CAL V	Save Execution Record	

Figure 59 Process Execution Record of Process Execution #10

SPC - AAT Workspace Assessment Proce	ss Improvement Help		
	€ 🛃		
P PROCESS DATA	M ASSESSMENT	PROCESS	SIMPROVEMENT
Process Executions Metric Process Execution Records Pr Reco Reco Sele	Data Process Execution Record Detail Record Info	: Marthátias / Rolas / Taols á	R. Tachniques
1 25 M. CAL ℓ 2 25 M. CAL ℓ 3 25 M. CAL ℓ 4 25 M. CAL ℓ 5 25 M. CAL ℓ 6 25 M. CAL ℓ 7 25 M. CAL ℓ 9 26 M. CAL ℓ 10 26 M. CAL ℓ 12 25 M. CAL ℓ 12 25 M. CAL ℓ 12 25 M. CAL ℓ 12 25 M. CAL ℓ 12 25 M. CAL ℓ 12 25 M. CAL ℓ 14 25 M. CAL ℓ 14 25 M. CAL ℓ 15 25 M. CAL ℓ 16 25 M. CAL ℓ	No 1 2 3	Name SRS UC_NODE STC	Software Requirements Specific Use Case Excel Sheet - NODE Software Test Case Document
17 25.M C.AL			Save Execution Record

Figure 60 Process Execution Record of Process Execution #10

SPC - AAT Workspace Assessment Proces	s Improvement Help			
	<u></u>			
PROCESS DATA	M ASSESSMENT	PROCE	ESS IMPROVEMENT	
Process Executions O Metric	Data			
Process Execution Records	Process Execution Record Detail			
PrRecoRecoSele	Record Info Inputs Outpu	ts Activities Roles Tool	s & Techniques	
2 25.M C.AL 🗹 💽	No	Name	Description	
3 25.M C.AL 🗹 🚨	1	UC_NODE	Use Case Excel Sheet - NODE	
4 25.M. C.AL	2	STC	Software Test Case Document	×
6 25.M., CAL.,				
7 25.MC.AL 🗹 🔻				
8 25.M C.AL 🗹 📻				
9 25.MC.AL 🗹 🛃				
11 25 M CAL				
12 25.M C.AL 🗹				
13 25.M C.AL 🖌				
14 25.M. C.AL				
16 25 M CAL				-
17 25.MC.AL				
18 25.M C.AL 🖌			Save Executio	n Record

Figure 61 Process Execution Record of Process Execution #10

SPC - AAT	eelmprovement Help			- • •
PROCESS DATA	M ASSESSMENT	PROCES	S IMPROVEMENT	
Process Executions Metric Process Execution Records Pr Records Process Execution Records	Data Process Execution Record Detail Record Info (Inputs) Output	s Arthátias Balas Taols	& Tachniquae	
1 25 M. CAL ℓ 2 25 M. CAL ℓ 2 25 M. CAL ℓ 3 26 M. CAL ℓ 4 25 M. CAL ℓ 5 25 M. CAL ℓ 6 25 M. CAL ℓ 9 26 M. CAL ℓ 9 26 M. CAL ℓ 1 26 M. CAL ℓ 1 26 M. CAL ℓ 12 25 M. CAL ℓ 12 26 M. CAL ℓ 12 25 M. CAL ℓ 12 25 M. CAL ℓ 13 25 M. CAL ℓ 14 26 M. CAL ℓ	No 1 2	Save Test Result Run Test Case	Save Test Resut	
16 25.M., CAL., V 16 25.M., CAL., V 17 25.M., CAL., V 18 25.M., CAL., V			Save Execu	tion Record

Figure 62 Process Execution Record of Process Execution #10

SPC - AAT	s Improvement Help				- 0 🔀
	<u> </u>				
PROCESS DATA	M ASSESSME	NT	PROCESS IMPR	OVEMENT	
Process Executions O Metric Process Execution Records Pr.RecoRecoSele	Data Process Execution Recor Record Info Inputs	d Detail Outputs Activities	Roles Tools & Tech	niques	
1 25.M C.A.L ψ 2 25.M C.A.L ψ 3 25.M C.A.L ψ 4 25.M C.A.L ψ 5 25.M C.A.L ψ 8 25.M C.A.L ψ 9 25.M C.A.L ψ 10 25.M C.A.L ψ 11 25.M C.A.L ψ 12 25.M C.A.L ψ 13 25.M C.A.L ψ 14 25.M C.A.L ψ 15 25.M C.A.L ψ 14 25.M C.A.L ψ 15 25.M C.A.L ψ 16 25.M C.A.L ψ 17 25.M C.A.L ψ 18 25.M C.A.L ψ 18 25.M C.A.L ψ	No 1	Name System Tester	Act_No	Description Performs System Testin	ecord

Figure 63 Process Execution Record of Process Execution #10

🐇 SPC - AAT Workspace Assessment Proces	s Improvement Help				- • •
	🈼 婱 💡				
PROCESS DATA	M ASSESSME	NT	PROCESS IMPRO	VEMENT	
Process Executions Metric Process Execution Records Pr Records Sele	Data Process Execution Record Record Info	d Detail	Roles Tools & Techn	inue	
1 25 M. ⊂ AL. w 2 25 M. ⊂ AL. w 3 25 M. ⊂ AL. w 4 25 M. ⊂ AL. w 5 25 M. ⊂ AL. w 6 25 M. ⊂ AL. w 7 25 M. ⊂ AL. w 8 25 M. ⊂ AL. w 9 25 M. ⊂ AL. w 10 25 M. ⊂ AL. w 11 25 M. ⊂ AL. w 12 25 M. ⊂ AL. w 13 25 M. ⊂ AL. w 14 25 M. ⊂ AL. w 15 25 M. ⊂ AL. w 16 25 M. ⊂ AL. w 17 25 M. ⊂ AL. w 18 25 M. ⊂ AL. w 19 25 M. ⊂ AL. w 18 25 M. ⊂ AL. w 18 25 M. ⊂ AL. w	No 1 2 3	Name Internet Explorer Microsoft Word Microsoft Excel	Act_No Act_No 1 1 1 1 1 1	Use Save Executi	on Record

Figure 64 Process Execution Record of Process Execution #10



Figure 65 Process Execution Record of Process Execution #11

SPC - AAT Workspace Assessment Proce	ss Improvement Help		
	€ 🍣		
PROCESS DATA	M ASSESSMENT	PROCESS	SIMPROVEMENT
Process Executions Metric Process Execution Records Pr Reco Reco Sete	Data Process Execution Record Detail Process Execution Record Detail	Activities / Poles / Tools 8	Tachainnac
1 25 M. C AL. ℓ 2 25 M. C AL. ℓ 3 25 M. C AL. ℓ 4 25 M. C AL. ℓ 5 25 M. C AL. ℓ 6 25 M. C AL. ℓ 7 26 M. C AL. ℓ 8 25 M. C AL. ℓ 9 25 M. C AL. ℓ 10 25 M. C AL. ℓ 12 25 M. C AL. ℓ 12 25 M. C AL. ℓ 12 25 M. C AL. ℓ 12 25 M. C AL. ℓ 12 25 M. C AL. ℓ 13 26 M. C AL. ℓ	No 1 2 3	Name SRS UC_NODE STC	Boftware Requirements Specific
15 25.M C.AL ✔ 16 25.M C.AL ✔ 17 25.M C.AL ✔ 18 25.M C.AL ✔			Save Execution Record

Figure 66 Process Execution Record of Process Execution #11

SPC - AAT Workspace Assessment Proces	s Improvement Help			
PROCESS DATA	M ASSESSMENT	Ð	PROCESS IMPROVEMENT	
Process Executions O Metric I	Data			
Process Execution Records	Process Execution Record De	tail	1/	
PrRecoRecoSele 1 25.MC.AL	Record Info Inputs O	utputs Activities Roles	Tools & Techniques	
2 25.M C.AL 🗹 😱	No	Name	Description	r 🛉
3 25.MC.AL	1	UC_NODE	Use Case Excel Sheet - NODE	
5 25 M. C.AL.	2	STC	Software Test Case Document	×
6 25.M C.AL 🗹 📃				
7 25.MC.AL 🗹 💙				
8 25.M. CAL. V				
10 25.MC.AL				
11 25.MC.AL				
12 25.M C.AL				
13 25.MC.AL				
15 25.M., C.AL.,				
16 25.M C.AL 🗹				-
17 25.M., C.AL, 🗹				
18 25.MC.AL			Save Execution Rec	cord

Figure 67 Process Execution Record of Process Execution #11

SPC - AAT	ss Immmøment Hein	_ 0 🔀
PROCESS DATA	M ASSESSMENT	
Process Executions Metric Process Execution Records PrRecoRecoSele	Data Process Execution Record Detail Record Info Controls Controls Roles Controls & Techniques	
1 25 M. CAL ✓ 2 25 M. CAL ✓ 3 26 M. CAL ✓ 4 25 M. CAL ✓ 5 25 M. CAL ✓ 6 25 M. CAL ✓ 7 26 M. CAL ✓ 9 26 M. CAL ✓ 9 26 M. CAL ✓ 10 26 M. CAL ✓ 12 25 M. CAL ✓ 12 26 M. CAL ✓ 12 26 M. CAL ✓ 12 26 M. CAL ✓ 12 26 M. CAL ✓ 13 26 M. CAL ✓ 14 25 M. CAL ✓ 15 25 M. CAL ✓ 16 25 M. CAL ✓	No Name Description 1 Save Test Result Save Test Result 2 Run Test Case Run Test Case	
17 25.M C.AL V 18 25.M C.AL V	Save Ex	ecution Record

Figure 68 Process Execution Record of Process Execution #11

SPC - AAT Workspace Assessment Process	s Improvement Help				-	- 0 💌
	5 🔊 🖉					
PROCESS DATA	M ASSESSME	NT	PROCES	SS IMPROVEMEN	т	
Process Executions Metric D Process Execution Records PrRecoRecoSele	oata Process Execution Record Record Info	d Detail	Roles Tools	& Techniques		
1 25.5. CAL V 2 25.M CAL V 3 26.M CAL V 4 25.M CAL V 5 25.M. CAL V 6 25.M. CAL V 7 25.M. CAL V 9 25.M. CAL V 10 25.M. CAL V 12 25.M. CAL V 12 25.M. CAL V 12 25.M. CAL V 12 25.M. CAL V 13 25.M. CAL V 14 25.M. CAL V 15 25.M. CAL V 16 25.M. CAL V 18 25.M. CAL V		Name System Tester	Act 1	No Perfo	Description rms System Testin	kecord

Figure 69 Process Execution Record of Process Execution #11

	🦻 놀 💡				
PROCESS DATA	M ASSESSME	NT	PROCESS IMPRO	/EMENT	
Process Executions Metri Process Execution Records PrRecoRele	Process Execution Record	d Detail	Roles Tools & Technic	jues	
1 25 M. CAL.	No 1 2 3	Name Internet Explorer Microsoft Word Microsoft Excel	Act_No 1 1 1 1 1	Description Web Browser Word Document Excel Sheet	

Figure 70 Process Execution Record of Process Execution #11

👙 SPC - AAT	
workspace Assessment Proce	ss improvement Help
	<u> </u>
PROCESS DATA	M ASSESSMENT
Process Executions O Metric	Data
Process Execution Records	Process Execution Record Detail
ri. zcbu, zredo, Selē. CAL. ⊄ 1 zcb, CAL. ⊄ Z 2 zcb, CAL. ⊄ Image: CAL. ⊄ 4 zcb, CAL. ⊄ Image: CAL. ⊄ 5 zcb, CAL. ⊄ Image: CAL. ⊄ 6 zcb, CAL. ⊄ Image: CAL. ⊄ 9 zcb, CAL. ⊄ Image: CAL. ⊄ 9 zcb, CAL. ⊄ Image: CAL. ⊄ 9 zcb, CAL. ⊄ Image: CAL. ⊄ 10 zcb, CAL. ⊄ Image: CAL. ⊄ 11 zcb, CAL. ⊄ Image: CAL. ⊄ 12 zcb, CAL. ⊄ Image: CAL. ⊄ 13 zcb, CAL. ⊄ Image: CAL. ⊄ 14 zcb, CAL. ⊄ Image: CAL. ⊄ 15 zcb, CAL. ⊄ Image: CAL. ⊄ 17 zcb, CAL. ⊄ Image: CAL. ⊄ 18 zcb, CAL. ⊄ Image: CAL. ⊄	Record into inputs Outputs Activities Roles Tools & Techniques Process Execution No: 12

Figure 71 Process Execution Record of Process Execution #12

SPC - AAT Workspace Assessment Proce	ss Improvement Help		- 0 🔀
	🏂 楶		
PROCESS DATA	M ASSESSMENT	PROCES	S IMPROVEMENT
Process Executions Metric Process Execution Records Pr Records Sele Pr	Data Process Execution Record Detail Record Info	- Vilchátics / Boles / Tools	8. Techniques
Toroto Color <	No 1 2 3	Activities Roles Tools Name SRS UC_NODE STC	Recription Software Requirements Specific Use Case Excel Sheet - NODE Software Test Case Document
17 [25.MC.AL			Save Execution Record

Figure 72 Process Execution Record of Process Execution #12

SPC - AAT Workspace Assessment Proces	s Improvement Help			- • •
PROCESS DATA	ASSESSMENT	PROCES	SS IMPROVEMENT	
Process Executions Metric I	Data			
Process Execution Records	Process Execution Record Detail			
PrRecoSele	Record Info Inputs Outputs	Activities Roles Tools	& Techniques	
2 25.MC.AL	No	Name	Description	
3 25.M C.AL 🗹 본	1	UC_NODE	Use Case Excel Sheet - NODE	
4 25.M C.AL 🗹 🔼	2	STC	Software Test Case Document	
5 25.MC.AL				
7 25 M C AL				
8 25.MC.AL 🗹 🚞				
9 25.MC.AL 🗹 🛔				
10 25.M C.AL				
11 25.M. CAL				
13 25 M CAL				
14 25.MC.AL				
15 25.M C.AL				
16 25.MC.AL				-
17 25.M. C.AL.				
10 23.mO.M			Save Execution	n Record

Figure 73 Process Execution Record of Process Execution #12

👙 SPC - AAT				- 0 💌
Workspace Assessment Proces	s Improvement Help			
PROCESS DATA	ASSESSMENT	PROCE	SS IMPROVEMENT	
Process Executions Metric Process Execution Records Pr. Reco. Sele Yether and and and and and and and and and and	Data Process Execution Record Detail Record Info Inputs Outputs	s Activities Roles Tools	& Techniques	
25 m CAL 𝒴 2 25 m CAL 𝒴 3 25 M CAL 𝒴 4 25 M CAL 𝒴 5 25 M CAL 𝒴 6 25 M CAL 𝒴 7 25 M CAL 𝒴 8 25 M CAL 𝒴 9 25 M CAL 𝒴 10 25 M CAL 𝒴	No 1 2	Name Save Test Result Run Test Case	Description Save Test Resut Run Test Case	
11 25 M. CAL. V 12 25 M. CAL. V 13 25 M. CAL. V 14 25 M. CAL. V 15 25 M. CAL. V 16 25 M. CAL. V 18 25 M. CAL. V 18 25 M. CAL. V			Save Execut	Tion Record

Figure 74 Process Execution Record of Process Execution #12

SPC - AAT Workspace Assessment Process	s Improvement Help			[- 0 💌
	<u></u>				
PROCESS DATA	M ASSESSME	NT	PROCESS IMF	PROVEMENT	
Process Executions Metric E Process Execution Records Pr Record Records	Process Execution Recor	d Detail	Polos Tools 9 Too	shnizuon	
1 26 M., CAL., W 2 25 M., CAL., W X 2 25 M., CAL., W X 4 25 M., CAL., W X 5 25 M., CAL., W X 6 25 M., CAL., W X 7 25 M., CAL., W X 8 25 M., CAL., W X 9 25 M., CAL., W X 10 25 M., CAL., W X 12 25 M., CAL., W X 13 25 M., CAL., W X 14 25 M., CAL., W X 15 25 M., CAL., W X 16 25 M., CAL., W X 17 25 M., CAL., W X 18 25 M., CAL., W X		Name System Tester	Act No	Description Performs System Testin	Record

Figure 75 Process Execution Record of Process Execution #12

SPC - AAT Workspace Assessment Proce	ss Improvement Help				- 0 ×
	<u>i</u>				
PROCESS DATA	M ASSESSME	NT	PROCESS IMPRO	VEMENT	
Process Executions Metric Process Execution Records PrRecoRecoSele rev	Data Process Execution Recor	d Detail Outputs Activities F	Roles Tools & Techni	ques	
1 25 M. ⊂ AL. ✓ 2 25 M. ⊂ AL. ✓ 3 25 M. ⊂ AL. ✓ 4 25 M. ⊂ AL. ✓ 5 25 M. ⊂ AL. ✓ 6 25 M. ⊂ AL. ✓ 7 25 M. ⊂ AL. ✓ 8 25 M. ⊂ AL. ✓ 9 25 M. ⊂ AL. ✓ 9 25 M. ⊂ AL. ✓ 9 25 M. ⊂ AL. ✓ 10 25 M. ⊂ AL. ✓ 12 25 M. ⊂ AL. ✓ 13 25 M. ⊂ AL. ✓ 14 25 M. ⊂ AL. ✓ 15 25 M. ⊂ AL. ✓ 16 25 M. ⊂ AL. ✓ 16 25 M. ⊂ C AL. ✓ 17 25 M. ⊂ C AL. ✓ 18 25 M. ⊂ C AL. ✓	No 1 2 3	Name Internet Explorer Microsoft Word Microsoft Excel	Act No	Description Web Browser Word Document Excel Sheet	

Figure 76 Process Execution Record of Process Execution #12

👙 SPC - AAT		
Workspace Assessment Proces	s Improvement Help	
PROCESS DATA	M ASSESSMENT	PROCESS IMPROVEMENT
Process Executions O Metric	Data	
Process Execution Records	Process Execution Record Detail	
Pr. Reco. Reco. Sele I 1 25.M. C.AL	Record Info Inputs Outputs Activities Roles Process Execution No: 3 Recorded On: 25 May 2007 Recorded By: C ALTUN	Tools & Techniques
18 25.MC.AL		Save Execution Record

Figure 77 Process Execution Record of Process Execution #13

SPC - AAT Workspace Assessment Proces	s Improvement Help		
	🏂 婱		
PROCESS DATA	ASSESSMENT	PROCESS	S IMPROVEMENT
Process Executions Metric	Data		
Process Execution Records	Process Execution Record Detail	Activitico Dolos Toolo 9	Teahnisuaa
Image: Section of the secti	No 1 2 3	Name SRS UC_NODE STC	Software Test Case Document
17 25.M., C.AL., V 18 25.M., C.AL., V			Save Execution Record

Figure 78 Process Execution Record of Process Execution #13

SPC - AAT Workspace Assessment Process	Improvement Help			- • ×
PROCESS DATA	ASSESSMENT	PROCES	SS IMPROVEMENT	
Process Executions O Metric D	ata			
Process Execution Records	Process Execution Record Detail			
PrRecoSele	Record Info Inputs Output	ts Activities Roles Tools	& Techniques	
2 25.MC.AL 🗹 💽	No	Name	Description	
3 25.MC.AL 🗹 🚨	1	UC_NODE	Use Case Excel Sheet - NODE	
4 25.MC.AL	2	STC	Software Test Case Document	×
6 25 M CAL				
7 25.MC.AL 🖌 🔻				
8 25.M C.AL 🗹 🚃				
9 25.M C.AL 🗹 🛃				
10 25.MC.AL				
12 25 M CAL				
13 25.MC.AL 🖌				
14 25.M C.AL 🖌				
15 25.M. C.AL				_
17 25 M CAL	<u>L</u>			
18 25.M., C.AL.,			Save Executio	n Record
			Save Executio	Intecord

Figure 79 Process Execution Record of Process Execution #13

SPC - AAT Workspace Assessment Process	s Improvement Help			×
		1.		
PROCESS DATA	M ASSESSMENT	PROCES	S IMPROVEMENT	
Process Executions O Metric E	Jata			
-Drocose Execution Decorde	-Drococe Execution Pocord Datail-			
Pr Rem Rem Sele	Process execution record Detail	Activiting Polos Tools	8 Tochniquos	
1 25.M. C.AL	Record mo inputs Output	Nome	Description	
3 25.M., C.AL.,	1	Save Test Result	Save Test Resut	
4 25.M C.AL 🗹 🔼	2	Run Test Case	Run Test Case	
5 25.M. C.AL	3	Create Test Package		
7 25.M C.AL 🖌 🔻				
8 25.M C.AL 🗹				
9 25.MC.AL 🗹 🚉				
11 25.M C.AL				
12 25.M C.AL				
13 25.M. C.AL.				
15 25.M C.AL 🗹				
16 25.M. C.AL				
17 25.MC.AL			Save Every	ion Record
			Save Execut	Ion Necolu

Figure 80 Process Execution Record of Process Execution #13

SPC - AAT Workspace Assessment Process	Improvement Help	
PROCESS DATA	M ASSESSMENT	PROCESS IMPROVEMENT
	ata Process Execution Record Detail Record Info Inputs Outputs Activities F No Name System Tester	Act_No Description 1 Performs System Testin X X X <t< th=""></t<>

Figure 81 Process Execution Record of Process Execution #13

👙 SPC - AAT Workspace Assessment Proce	ess Improvement Help				- 0 💌
	🏂 婱 💡				
PROCESS DATA	M ASSESSME	NT	PROCESS IMPRO	OVEMENT	
Process Executions Metri Process Execution Records PrRecoRecoSele	c Data	d Detail Outputs Activities	Roles Tools & Techr	iques	
1 25 M C AL ℓ 2 26 M. C AL. ℓ 3 26 M. C AL. ℓ 4 26 M. C AL. ℓ 5 25 M C AL. ℓ 7 25 M C AL. ℓ 8 25 M C AL. ℓ 9 25 M C AL. ℓ 9 25 M C AL. ℓ 9 25 M C AL. ℓ 10 25 M C AL. ℓ 12 25 M C AL. ℓ 13 25 M C AL. ℓ 14 25 M C AL. ℓ 15 25 M C AL. ℓ 16 25 M C AL. ℓ 17 25 M C AL. ℓ 18 25 M C AL. ℓ	No 1 2 3 3 4	Name Internet Explorer Microsoft Word Microsoft Excel CA Harvest	Act_No 1 1 3	Description Web Browser Word Document Excel Sheet Configuration Managem	i i i i i i i i i i i i i i i i i i i

Figure 82 Process Execution Record of Process Execution #13



Figure 83 Process Execution Record of Process Execution #14

SPC - AAT Workspace Assessment Proce	ss Improvement Help		
	€ 🍣		
PROCESS DATA	M ASSESSMENT	PROCES	S IMPROVEMENT
Process Executions Metric Process Execution Records Pr Records Sele Pr	Data Process Execution Record Detail Record Info	· Activities / Boles / Tools	8. Techniques
1 25 M. CAL ℓ 2 25 M. CAL ℓ 3 25 M. CAL ℓ 3 25 M. CAL ℓ 4 25 M. CAL ℓ 5 25 M. CAL ℓ 6 25 M. CAL ℓ 9 25 M. CAL ℓ 9 25 M. CAL ℓ 9 25 M. CAL ℓ 9 25 M. CAL ℓ 10 25 M. CAL ℓ 11 25 M. CAL ℓ 12 25 M. CAL ℓ 13 25 M. CAL ℓ 14 25 M. CAL ℓ 15 25 M. CAL ℓ 16 25 M. CAL ℓ	No 1 2 3	Name SRS UC_NODE STC	Reciription Software Requirements Specific Use Case Excel Sheet - NODE Software Test Case Document
17 25.M., C.AL., V 18 25.M., C.AL., V			Save Execution Record

Figure 84 Process Execution Record of Process Execution #14

SPC - AAT Workspace Assessment Process	s Improvement Help			
PROCESS DATA	M ASSESSMENT	PROCES	SIMPROVEMENT	
Process Executions O Metric I	Data			
Process Execution Records	Process Execution Record Detail			
PrRecoReco Sele	Record Info Inputs Outputs	Activities Roles Tools	& Techniques	
1 25.M. CAL	No	Name	Description	
3 25.MC.AL 🗹	1	UC_NODE	Use Case Excel Sheet - NODE	
4 25.M C.AL 🗹 🔼	2	STC	Software Test Case Document	
5 25.MC.AL			÷	
7 25 M C AL				
8 25.MC.AL				
9 25.M C.AL 🗹 🔶↓				
10 25.M C.AL 🗹 🧮				
11 25.MC.AL				
13 25.M., C.AL.,				
14 25.M., C.AL., V				
15 25.M C.AL 🖌				
16 25.MC.AL				_
17 25.M. C.AL.				
10 20.mO.AL			Save Executio	n Record

Figure 85 Process Execution Record of Process Execution #14

SPC - AAT	s Improvement Help		
	2 De la companya de l		
PROCESS DATA	M ASSESSMENT	PROCESS IMPROVEMENT	
Process Executions Metric Process Execution Records PrRecoRecoSele	Process Execution Record Detail	iffies Roles Tools & Techniques	
1 25 M. CAL ✓ 2 25 M. CAL. ✓ 3 26 M. CAL. ✓ 4 25 M. CAL. ✓ 5 26 M. CAL. ✓ 5 26 M. CAL. ✓ 8 25 M. CAL. ✓ 9 25 M. CAL. ✓ 10 25 M. CAL. ✓ 10 25 M. CAL. ✓ 11 25 M. CAL. ✓ 12 25 M. CAL. ✓ 13 26 M. CAL. ✓ 13 26 M. CAL. ✓ 13 26 M. CAL. ✓ 14 25 M. CAL. ✓ 15 25 M. CAL. ✓ 16 25 M. CAL. ✓	No Save Tes 2 Run Tes 3 Create T	Name Description st Result Save Test Result tCase Run Test Case 'est Package Image: Case	
18 25.MC.AL		Save Execution Rece	ord

Figure 86 Process Execution Record of Process Execution #14

SPC - AAT Workspace Assessment Process	s Improvement Help					- • 🔀
	🌮 📚 💡					
PROCESS DATA	M ASSESSME	NT	PRC	DCESS IMPROVEMEN	т	
Process Executions Metric D Process Execution Records PrRecoRecoSele	Process Execution Record	d Detail	Roles	ools & Techniques		
1 25 M. CA V 2 25 M. CA V 4 25 M. CA V 5 25 M. CA V 6 25 M. CA V 7 25 M. CA V 8 25 M. CA V 9 25 M. CA V 10 25 M. CA V 11 25 M. CA V 12 25 M. CA V 13 25 M. CA V 14 25 M. CA V 15 25 M. CA V 16 25 M. CA V 18 25 M. CA V		Name System Tester		Act No Perfo	Description rms System Testin	ecord

Figure 87 Process Execution Record of Process Execution #14

SPC - AAT Workspace Assessment Proce	ss Improvement Help				- 0 💌
	<u> </u>				
PROCESS DATA	M ASSESSME	NT	PROCESS IMPRO	DVEMENT	
Process Executions Metric Process Execution Records PrRecoRecoSele	Data Process Execution Recor Record Info	d Detail Outputs Activities	Roles Tools & Techn	iques	
1 25 M C AL ℓ 2 5 M C AL ℓ 3 25 M C AL ℓ 4 25 M C AL ℓ 5 25 M C AL ℓ 7 25 M C AL ℓ 8 25 M C AL ℓ 9 25 M C AL ℓ 10 25 M C AL ℓ 11 25 M C AL ℓ 12 25 M C AL ℓ 12 25 M C AL ℓ 12 25 M C AL ℓ 13 25 M C AL ℓ 14 25 M C AL ℓ 15 25 M C AL ℓ 17 25 M C AL ℓ 18 25 M C AL ℓ 19 25 M C AL ℓ 11 25 M C AL ℓ 12 25 M C AL ℓ 13 25 M C AL ℓ 14 25 M C AL ℓ 17 25 M C AL ℓ 18 25 M C AL ℓ	No 1 2 3 4	Name Internet Explorer Microsoft Word Microsoft Excel (CA Harvest	Act_No 1 1 1 1 3	Description Web Browser Word Document Excel Sheet Configuration Managem	

Figure 88 Process Execution Record of Process Execution #14

An SDC AAT	
Markenaco Accocement Broom	oes Improvement Help
Workspace Assessment Proce	233 Impi overnenk melp
PROCESS DATA	M ASSESSMENT
Process Executions O Metri	c Data
Process Execution Records	Process Execution Record Detail
Pr. Reco. Reco. Sele. 1 25 M C AL ✓ 2 25 M C AL ✓ 3 25 M C AL ✓ 4 25 M C AL ✓ 5 25 M C AL ✓ 6 25 M C AL ✓ 7 25 M C AL ✓ 9 25 M C AL ✓ 9 25 M C AL ✓ 10 25 M C AL ✓ 12 25 M C AL ✓ 12 25 M C AL ✓ 12 25 M C AL ✓ 12 25 M C AL ✓ 13 25 M C AL ✓ 14 25 M C AL ✓ 15 25 M C AL ✓ 16 25 M C AL ✓ 18 25 M C AL ✓	Record Info Inputs Outputs Activities Roles Tools & Techniques Process Execution No: 15 Image: Control of the second se

Figure 89 Process Execution Record of Process Execution #15

SPC - AAT Workspace Assessment Proces	s Improvement Help			
PROCESS DATA	M ASSESSMENT	PROCESS	S IMPROVEMENT	
Process Executions Metric I	Data			
Process Execution Records	Process Execution Record Detail Record Info Inputs Outputs	Activities Roles Tools &	k Techniques	
2 25.MC.AL	No	Name	Description	r+ -
3 25.M C.AL 🗹	1	SRS	Software Requirements Specific	
4 25.MCAL ∠	2	UC_NODE	Use Case Excel Sheet - NODE	×
6 25.MC.AL	3	STC	Software Test Case Document	
7 25.M. C.AL				
9 25.MC.AL				
10 25.M C.AL 🗹				
11 25.M. C.AL.				
13 25.M., C.AL.,				
14 25.M C.AL 🖌				
15 25.M. C.AL				
17 25.M., C.AL.,				
18 25.M C.AL 🗹			Save Execution Rec	cord
			1	

Figure 90 Process Execution Record of Process Execution #15

SPC - AAT Workspace Assessment Process	s Improvement Help				
PROCESS DATA	M ASSESSMEN	IT	PROCESS	S IMPROVEMENT	
Process Execution Records	Process Execution Record	I Detail Outputs Activities	Roles Tools 8	k Techniques	
1 25.M., CAL., e' 3 25.M., CAL., e' 4 25.M., CAL., e' 5 25.M., CAL., e' 6 25.M., CAL., e' 8 25.M., CAL., e' 9 25.M., CAL., e' 9 25.M., CAL., e' 10 25.M., CAL., e' 11 25.M., CAL., e' 12 25.M., CAL., e' 13 25.M., CAL., e' 14 25.M., CAL., e' 15 25.M., CAL., e' 16 25.M., CAL., e' 17 25.M., CAL., e' 18 25.M., CAL., e' 18 25.M., CAL., e'		UC_NODE STC	Vame	Description Use Case Excel Sheet Software Test Case Dr	node in the second seco

Figure 91 Process Execution Record of Process Execution #15

👙 SPC - AAT				- • •
Workspace Assessment Process	Improvement Help			
	De la companya de la			
PROCESS DATA	ASSESSMENT	PROCESS	IMPROVEMENT	
Process Executions Metric Data	ata			
Process Execution Records	Process Execution Record Detail			
PrRecoSele	Record Info Inputs Outputs	Activities Roles Tools &	Techniques	
2 25.M., C.AL.,	No	Name	Description	
3 25.M C.AL 🗹 본	1	Save Test Result	Save Test Resut	
4 25.MC.AL 🗹 🔼	2	Run Test Case	Run Test Case	×
6 25.M. CAL	3	Create Test Package		
7 25.MC.AL 🗹 🔻				
8 25.M C.AL 🗹 🚃				
9 25.MC.AL				
11 25.MC.AL				
12 25.M C.AL				
13 25.M. C.AL 🖌				
15 25 M CAL				
16 25.M C.AL 🖌				•
17 25.M C.AL				
18 [25.M[C.AL 🗹			Save Execution	on Record

Figure 92 Process Execution Record of Process Execution #15

👙 SPC - AAT				E	- 0 -
Workspace Assessment Process	s Improvement Help				
	🏂 婱 💡				
PROCESS DATA	M ASSESSMEN	NT	PROCESS IMPR	ROVEMENT	
Process Executions O Metric E	Data	12-6-7			
Process Execution Records	Record Info Inputs	Outputs Activities	Roles Tools & Tech	niques	
1 25.M. C AL ℓ 25.M. C AL ℓ 25.M. C AL ℓ 25.M. C AL ℓ 25.M. C AL ℓ 25.M. C AL ℓ 25.M. C AL ℓ 25.M. C AL ℓ 25.M. C AL ℓ 10 25.M. C AL ℓ 11 25.M. C AL ℓ 12 25.M. C AL ℓ 11 25.M. C AL ℓ 11 25.M. C AL ℓ 12 25.M. C AL ℓ 11 25.M. C AL ℓ 12 25.M. C AL ℓ 12 25.M. C AL ℓ 13 25.M. C AL ℓ	No 1	Name System Tester	Act_No	Description Performs System Testin.	
17 25.M., C.AL., 🔽 18 25.M., C.AL., 🗹				Save Execution F	Record

Figure 93 Process Execution Record of Process Execution #15

SPC - AAT Workspace Assessment Proce	ess Improvement Help				
	🈼 놀 💡				
PROCESS DATA	M ASSESSME	NT	PROCESS IMPRO	DVEMENT	
Process Executions Metri Process Execution Records PrRecoRecoSele	c Data Process Execution Recor Record Info Inputs	d Detail	Roles Tools & Techn	iques	
1 25 M. CAL. V 2 5 M. CAL. V 3 25 M. CAL. V 4 25 M. CAL. V 5 25 M. CAL. V 8 25 M. CAL. V 8 25 M. CAL. V 8 25 M. CAL. V 9 25 M. CAL. V 10 25 M. CAL. V 11 25 M. CAL. V 12 25 M. CAL. V 12 25 M. CAL. V 13 25 M. CAL. V 14 25 M. CAL. V 15 25 M. CAL. V 16 25 M. CAL. V 17 25 M. CAL. V 17 25 M. CAL. V 18 25 M. CAL. V 19 25 M. CAL. V 10 25 M. CAL V 10 25 M. CAL	NO 1 2 3 4	Name Internet Explorer Microsoft Word Microsoft Excel CA Harvest	Act_No 1 1 1 1 3	Description Web Browser Word Document Excel Sheet Configuration Managem	ecord

Figure 94 Process Execution Record of Process Execution #15



Figure 95 Process Execution Record of Process Execution #16

SPC - AAT Workspace Assessment Proces	s Improvement Help		- • •
PROCESS DATA	M ASSESSMENT	PROCESS	SIMPROVEMENT
Process Executions Metric I Process Execution Records	Data		
PrRecoRecoSele 1 25.MCAL V 2 25.MCAL V 3 25.MCAL V 4 25.MCAL V 5 25.MCAL V	Record Info Inputs Outputs	i Activities Roles Tools 8 Name SRS UC_NODE STC	s Techniques
7 25 M. CAL Ø 8 25 M. CAL Ø 9 25 M. CAL Ø 10 25 M. CAL Ø 11 25 M. CAL Ø 12 25 M. CAL Ø 13 25 M. CAL Ø 14 25 M. CAL Ø 15 25 M. CAL Ø 16 25 M. CAL Ø 17 25 M. CAL Ø 18 25 M. CAL Ø			Save Execution Record

Figure 96 Process Execution Record of Process Execution #16

SPC - AAT Workspace Assessment Process	Improvement Help		G	_ 0 ×
PROCESS DATA	M ASSESSMENT	PROCESS	S IMPROVEMENT	
Process Execution Records	Process Execution Record Detail	Activities Roles Tools &	k Techniques	
1 20 M 0 AL ℓ 2 25 M 0 AL ℓ 3 25 M 0 AL ℓ 4 25 M 0 AL ℓ 5 25 M 0 AL ℓ 6 25 M 0 AL ℓ 9 25 M. 0 AL ℓ 9 25 M. 0 AL ℓ 10 25 M. 0 AL ℓ 11 25 M. 0 AL ℓ 12 25 M 0 AL ℓ 13 25 M 0 AL ℓ 14 25 M 0 AL ℓ 15 25 M. 0 AL ℓ 16 25 M. 0 AL ℓ 17 25 M. 0 AL ℓ 18 25 M 0 AL ℓ 19 25 M. 0 AL ℓ	No 1 2	Name UC_NODE STC	Description Use Case Excel Sheet - NODE Software Test Case Document	Record

Figure 97 Process Execution Record of Process Execution #16

SPC - AAT Workspace Assessment Proces	s Improvement Help			
	🏂 질			
PROCESS DATA	ASSESSMENT	PROCE	SS IMPROVEMENT	
Process Executions Metric Process Execution Records	Data Process Execution Record Detail			
PrRecoRecoSele 1 25.MC.AL	Record Info Inputs Outputs	Activities Roles Tool	s & Techniques	
2 25.M. C.AL	No	Name Coup Tast Deput	Description	
4 25.M., C.AL.,	2	Dave rest Result	Dup Test Case	
5 25.M C.AL 🗹 🔺	3	Create Test Parkane	Run rest case	
6 25.MC.AL		oroato rootr actago		
8 25.MC.AL				
9 25.M C.AL 🗹 🛃				
10 25.MC.AL				
12 25.M C.AL				
13 25.M C.AL				
14 25.MC.AL				
16 25.M C.AL 🖌				•
17 25.M C.AL				
18 Z5.MC.AL			Save Execu	tion Record

Figure 98 Process Execution Record of Process Execution #16

SPC - AAT Workspace Assessment Proces	s Improvement Help
PROCESS DATA	ASSESSMENT
Process Executions Metric Process Execution Records	Data
PrRecoRecoSele	Record Info Inputs Outputs Activities Roles Tools & Techniques
1 25 m. C AL. 𝔅 2 25 M. C AL. 𝔅 3 25 M. C AL. 𝔅 4 26 M. C AL. 𝔅 5 25 M. C AL. 𝔅 6 25 M. C AL. 𝔅 7 25 M. C AL. 𝔅 9 25 M. C AL. 𝔅 9 25 M. C AL. 𝔅 10 25 M. C AL. 𝔅 11 25 M. C AL. 𝔅 12 25 M. C AL. 𝔅 12 25 M. C AL. 𝔅 12 25 M. C AL. 𝔅 12 25 M. C AL. 𝔅 12 25 M. C AL. 𝔅 12 25 M. C AL. 𝔅 13 25 M. C AL. 𝔅 14 25 M. C AL. 𝔅 15 𝔅 𝔅 𝔅 16 𝔅 𝔅 𝔅 17 𝔅 𝔅 𝔅 𝔅	No Name Act_No Description 1 System Tester 1 Performs System Testin Image: Comparison of the system Testin
18 25.MC.AL	Save Execution Record

Figure 99 Process Execution Record of Process Execution #16

SPC - AAT Workspace Assessment Proc	ess Improvement Help				- 0 .
	🏂 婱 💡)			
PROCESS DATA	M ASSESSME	ENT	PROCESS IMPRO	VEMENT	
Process Executions Metr Process Execution Records PrRecoRecoSele	c Data	rd Detail	Roles Tools & Techn	iques	
1 25 M CAL r 2 25 M. CAL r 3 25 M. CAL r 4 25 M. CAL r 5 25 M CAL r 7 26 M. CAL r 8 25 M. CAL r 9 25 M. CAL r 9 25 M. CAL r 9 25 M. CAL r 10 25 M. CAL r 11 25 M. CAL r 12 25 M. CAL r 13 25 M. CAL r 14 25 M. CAL r 15 25 M. CAL r 16 25 M. CAL r 17 26 M. CAL r 13 26 M. CAL r 14 25 M. CAL r	No 1 2 3 4	Name Internet Explorer Microsoft Word Microsoft Excel CA Harvest	Act_No 1 1 1 1 3	Description Web Browser Word Document Excel Sheet Configuration Managem	
16 25.M C.AL ⊭ 17 25.M C.AL ⊭ 18 25.M C.AL ⊭				Save Execution R	ecord

Figure 100 Process Execution Record of Process Execution #16

👙 SPC - AAT	
PROCESS DATA	M ASSESSMENT
Process Executions O Metric	Data
Process Execution Records Pr. Reco. Sele. 1 26 M. CAL. 2 26 M. CAL. 3 25 M. CAL. 4 26 M. CAL. 6 25 M. CAL. 7 25 M. CAL. 8 26 M. CAL. 8 26 M. CAL. 9 26 M. CAL. 9 26 M. CAL. 9 26 M. CAL. 9 26 M. CAL. 9 26 M. CAL. 10 25 M. CAL. 12 25 M. CAL. 12 25 M. CAL. 12 25 M. CAL. 12 25 M. CAL. 12 25 M. CAL. 13 26 M. CAL. 14 25 M. CAL. 15 25 M. CAL. 16 25 M. CAL. 18 25 M. CAL.	Process Execution Record Detail Record Info Inputs Outputs Activities Roles Tools & Techniques Process Execution No: [7 Recorded On: [25 May 2007 []] Recorded On: [25 May 2007 []] []] Process Execution No: [] []] Process Execution Questionnaire>> []] Save Execution Record

Figure 101 Process Execution Record of Process Execution #17

SPC - AAT Workspace Assessment Proce	ss Improvement Help			- • • ×
	🏂 놀 💡			
PROCESS DATA	ASSESSMENT	PROCE:	SS IMPROVEMENT	
Process Executions O Metrie	Data			
Process Execution Records	Process Execution Record Detail			
1 25 M C AL. V 2 25 M C AL. V 3 25 M C AL. V 4 25 M C AL. V 5 25 M C AL. V 6 25 M C AL. V 7 25 M C AL. V 8 26 M C AL. V 9 25 M C AL. V 9 25 M C AL. V 10 25 M C AL. V 11 25 M C AL. V	No 1 2 3	Name SRS UC_NODE STC	Software Requirements Specific. Use Case Excel Sheet - NODE Software Test Case Document	
12 25.M., CAL., F 13 25.M., CAL., F 14 25.M., CAL., F 15 25.M., CAL., F 16 25.M., CAL., F 17 25.M., CAL., F 18 25.M., CAL., F 18 25.M., CAL., F			Save Execution f	▼ Record

Figure 102 Process Execution Record of Process Execution #17

SPC - AAT Workspace Assessment Process	s Improvement Help			
PROCESS DATA	M ASSESSMENT	PROCES	IN IMPROVEMENT	
Process Executions O Metric I Process Execution Records Pr Reco Reco Sele	Data Process Execution Record Detail Record Detail	Activities / Bales / Tools	8. Tachnimus	
1 25 M. CAL. V 2 25 M. CAL. V 4 25 M. CAL. V 5 25 M. CAL. V 6 25 M. CAL. V 8 25 M. CAL. V 9 25 M. CAL. V 9 25 M. CAL. V 10 25 M. CAL. V 11 25 M. CAL. V 11 25 M. CAL. V 12 25 M. CAL. V 13 25 M. CAL. V 13 25 M. CAL. V 14 25 M. CAL. V 15 25 M. CAL. V 15 25 M. CAL. V 15 25 M. CAL. V 15 25 M. CAL. V 15 25 M. CAL. V 16 25 M. CAL. V 17 25 M. CAL. V 18 25 M. CAL. V 19 25 M. CAL. V 19 25 M. CAL. V 10 25 M. CAL.		Name UC_NODE STC	Description Use Case Excel Sheet - NODE Software Test Case Document	n Record

Figure 103 Process Execution Record of Process Execution #17

SPC - AAT Workspace Assessment Process	improvement Help			
	🏂 婱			
PROCESS DATA	ASSESSMENT	PROCES	IMPROVEMENT	
Process Executions Metric E	ata			
Process Execution Records	Process Execution Record Detail	Verin Veri		
1 25.MC.AL	No	Name	Description	
3 25.M C.AL 4 25.M C.AL 5 25.M C.AL ▲	2	Run Test Case	Run Test Case	
6 25.M C.AL				=
8 25.M C.AL 9 25.M C.AL 10 25.M C.AL 2				_
11 25.M C.AL 🗹 12 25.M C.AL 🗹				
13 25.MC.AL 14 25.MC.AL 15 25.M. C.AL				
16 25.M C.AL 🖌				
18 25.MC.AL			Save Execu	tion Record

Figure 104 Process Execution Record of Process Execution #17

SPC - AAT Workspace Assessment Process	Improvement Help	
PROCESS DATA	ASSESSMENT	PROCESS IMPROVEMENT
● Process Executions ○ Metric D Process Execution Records Pr. Reco., Sele 1 25.M., C.A, 𝒴 2 25.M., C.A, 𝒴 3 25.M., C.A, 𝒴 4 25.M., C.A, 𝒴 5 25.M., C.A, 𝒴 6 25.M., C.A, 𝒴 7 25.M., C.A, 𝒴 8 25.M., C.A, 𝒴 9 25.M., C.A, 𝒴 10 25.M., C.A, 𝒴 11 25.M., C.A, 𝒴 12 25.M., C.A, 𝒴 13 25.M., C.A, 𝒴 13 25.M., C.A, 𝒴 14 25.M., C.A, 𝒴 15 25.M., C.A, 𝒴 16 25.M., C.A, 𝒴 18 25.M., C.A, 𝒴 18 25.M., C.A, 𝒴	ta Process Execution Record Detail Record Info Inputs Outputs Activ No Name System Tester	vities Roles Tools & Techniques

Figure 105 Process Execution Record of Process Execution #17

👙 SPC - AAT Workspace Assessment Proce	ss Improvement Help				
	<u>ک</u>				
PROCESS DATA	M ASSESSME	NT	PROCESS IMPRO	DVEMENT	
Process Executions Metric Process Execution Records Pr.RecoRecoSele	Data Process Execution Recor Record Info	d Detail	Roles Tools & Techr	iques	
1 25 M., C.A.L., V 2 25 M., C.A.L., V 3 25 M., C.A.L., V 4 25 M., C.A.L., V 5 25 M., C.A.L., V 7 25 M., C.A.L., V 8 25 M., C.A.L., V 9 25 M., C.A.L., V 10 25 M., C.A.L., V 11 25 M., C.A.L., V 12 25 M., C.A.L., V 13 25 M., C.A.L., V 13 25 M., C.A.L., V 14 25 M., C.A.L., V 15 25 M., C.A.L., V 16 25 M., C.A.L., V 17 25 M., C.A.L., V 18 25 M., C.A.L., V 18 25 M., C.A.L., V 18 25 M., C.A.L., V 18 25 M., C.A.L., V 18 25 M., C.A.L., V	No 1 2 3 	Name Internet Explorer Microsoft Word Microsoft Excel	Act_No 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Description Web Browser Word Document Excel Sheet	en Record

Figure 106 Process Execution Record of Process Execution #17

Worksnace Assessment Proce	ss Immovement Heln
	2 S
PROCESS DATA	M ASSESSMENT
Process Executions Metric	: Data
Process Execution Records	Process Execution Record Detail
Pr. RecoRecoSele 1 25.M C AL 𝕐 2 25.M C AL 𝑘 3 25.M C AL 𝑘 4 25.M C AL 𝑘 5 25.M C AL 𝑘 6 25.M C AL 𝑘 9 25.M C AL 𝑘 9 25.M C AL 𝑘 10 25.M C AL 𝑘 11 25.M C AL 𝑘 12 25.M C AL 𝑘 13 25.M C AL 𝑘 14 25.M C AL 𝑘 15 25.M C AL 𝑘 16 25.M C AL 𝑘 17 25.M C AL 𝑘 18 25.M C AL 𝑘	Record Info Inputs Outputs Activities Roles Tools & Techniques Process Execution No: 18 Recorded On: 25 May 2007 Image: Control of the contro of the control of the control of the control of the co

Figure 107 Process Execution Record of Process Execution #18

SPC - AAT Workspace Assessment Proces	s Improvement Help			
	🏂 🎅			
PROCESS DATA	M ASSESSMENT	PROCES:	S IMPROVEMENT	
Process Executions Metric Process Execution Records PrRecoRecoSele	Process Execution Record Detail	s / Activities / Roles / Tools /	techniques	
1 25.MC.AL	No No	Name	Description	
3 25.MC.AL	1	SRS	Software Requirements Specific	
4 25.M C.AL 🗹 🔼	2	UC_NODE	Use Case Excel Sheet - NODE	×
5 25.MC.AL	3	STC	Software Test Case Document	
7 25 M C AL v 8 25 M C AL v 9 25 M C AL v 10 25 M C AL v 11 25 M C AL v 12 25 M C AL v 13 25 M C AL v 14 25 M C AL v 15 25 M C AL v 16 25 M C AL v 17 25 M C AL v 18 25 M C AL v			Save Execution Re	▼ ecord

Figure 108 Process Execution Record of Process Execution #18

SPC - AAT Workspace Assessment Proces	s Improvement Help			
PROCESS DATA	ASSESSMENT	PROCES	S IMPROVEMENT	
Process Executions Metric Process Execution Records	Data			
PrRecoRecoSele	Record Info Inputs Outputs	Activities Roles Tools	& Techniques	
1 25.M., C AL v 2 25.M., C AL v 3 25.M., C AL v 4 25.M., C AL v 5 25.M., C AL v 6 25.M., C AL v 7 25.M., C AL v 9 25.M., C AL v 10 25.M., C AL v 11 25.M., C AL v 12 25.M., C AL v 13 25.M., C AL v 14 25.M., C AL v 15 25.M., C AL v 16 25.M., C AL v	No 1 2	Name UC_NODE STC	Description Use Case Excel Sheet - NODE Software Test Case Document	
17 25.M., C.AL., V 18 25.M., C.AL., V			Save Execution	Record

Figure 109 Process Execution Record of Process Execution #18

SPC - AAT Workspace Assessment Proces	s Improvement Help			
PROCESS DATA	M ASSESSMENT	PROCES	S IMPROVEMENT	
Process Executions Metric Process Execution Records Pr. RecoRecoSele 1255 M C Al	Process Execution Record Detail	s Activities Roles Tools	& Techniques	
1 25.M CAL V 3 25.M CAL V 4 25.M CAL V 5 25.M CAL V	No 1 2	Name Save Test Result Run Test Case	Description Save Test Resut Run Test Case	
7 25 M C AL V 8 25 M C AL V 9 25 M C AL V 10 25 M C AL V 11 25 M C AL V				_
12 25.M CAL ⊭ 13 26.M CAL ⊭ 14 25.M CAL ⊭ 15 25.M CAL ⊭ 16 25.M CAL ⊭ 17 25.M CAL ⊭				
18 25.MC.AL			Save Execut	ion Record

Figure 110 Process Execution Record of Process Execution #18

SPC - AAT Workspace Assessment Process I	mprovement Help			E	
Process Executions Metric Da Process Execution Records 1 125 M. CAL. 1 12 5 M. CAL. 1 12 5 M. CAL. 1 12 5 M. CAL. 1 12 5 M. CAL. 1 12 5 M. CAL. <th>ASSESSMEN ta Process Execution Record Record Info mputs No 1</th> <th>IT Detail Outputs Activities Name System Tester</th> <th>Roles Tools & Techn Act_No 1</th> <th>OVEMENT</th> <th></th>	ASSESSMEN ta Process Execution Record Record Info mputs No 1	IT Detail Outputs Activities Name System Tester	Roles Tools & Techn Act_No 1	OVEMENT	

Figure 111 Process Execution Record of Process Execution #18
∯ SPC - AAT Workspace Assessment Proces	s Improvement Help				- • •
	🈼 놀 💡				
PROCESS DATA	M ASSESSME	NT	PROCESS IMPRO	VEMENT	
Process Executions Metric Process Execution Records Pr.Reco.Reco.Sele Pr.Reco.Reco.Sele	Data Process Execution Record Record Info Inputs	d Detail Outputs Activities	Roles Tools & Techn	ques	
1 25.MC.A	No 1 2 3	Name Internet Explorer Microsoft Word Microsoft Excel	Act_No 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Description Web Browser Word Document Excel Sheet	
17 25.M., C.AL., V 18 25.M., C.AL., V				Save Execution	on Record

Figure 112 Process Execution Record of Process Execution #18

Process Execution Records of Case Study B

👙 SPC - AAT		
Workspace Assessment Process Improvement Help		
PROCESS DATA MASSE	SSMENT	PROCESS IMPROVEMENT
	cord Detail S Outputs Activities Rol x [1 25.Haz.2007 C.ALTUN	es Tools & Techniques
16 25 C.A V 17 25 C.A V 18 25 C.A V		Save Execution Record

Figure 113 Process Execution Record of Process Execution #1

SPC - AAT	eelmnraamant Haln		
)	
PROCESS DATA	M ASSESSM	AENT	PROCESS IMPROVEMENT
Process Executions Metric Process Execution Records ProRecSel]	c Data Process Execution Record Record Info Inputs	I Detail	oles Tools & Techniques
1 25. CA. V 2 25 CA V 3 25 CA V 4 25 CA V 5 25 CA V 6 25 CA V 7 25 CA V 8 25 CA V 9 25 CA V 10 25 CA V 11 25 CA V 12 25 CA V 13 25 CA V 14 25 CA V 15 25 CA V 16 25 CA V 18 25 CA V	No 1 2 3	SRS SRC UC_NODE	Software Requirements Spec Software Test Case Document Use Case Excel Sheet - NODE

Figure 114 Process Execution Record of Process Execution #1

👙 SPC - AAT			
Workspace Assessment Proce	ess Improvement Help		
	🏂 婱 💡		
PROCESS DATA	M ASSESSMEN	r 🛛 🖁	PROCESS IMPROVEMENT
Process Executions Metri	c Data	ail	
ProRecSel	Record Info Inputs Ou	tputs Activities Roles	Tools & Techniques
2 25 C.A V	No	Name	Description
3 25 C.A 🖌 👗	1	STC	Software Test Case Document
4 25 C.A 🗹	2	UC_NODE	Use Case Excel Sheet - NODE
6 25 C.A 🖌			
7 25 C.A 🗹 💙			
8 25 C.A 🗹			
10 25 C.A 🖌 🎽			
11 25 C.A 🖌			
12 25 C.A 🖌			
14 25 C.A			
15 25 C.A 🖌			-
16 25 C.A			
17 25 C.A 🖌			Save Execution Record

Figure 115 Process Execution Record of Process Execution #1

SPC - AAT Workspace Assessment Pro	cess Improvement Help			
	🏂 婱 💡			
PROCESS DATA	M ASSESSMENT		PROCESS IMPROVEMENT	
Process Executions O Met	ric Data			
Process Execution Records	Process Execution Record Deta	il Activities Roles	Tools & Tachniquas	
1 25 CA. V 2 25 CA. V 3 25 CA. V 4 25 CA. V 5 25 CA. V 6 25 CA. V 7 25 CA. V 9 25 CA. V 10 25 CA. V 11 25 CA. V 12 25 CA. V 12 25 CA. V 12 25 CA. V 12 25 CA. V 14 25 CA. V 15 25 CA. V 16 25 CA. V		Name Run Test Case Save Test Result Create Test Package	Tous & rechniques Description Run Test Case Save Test Resut	
17 25 C.A 🗹 18 25 C.A 🗹			Save Execut	ion Record

Figure 116 Process Execution Record of Process Execution #1

👙 SPC - AAT	ress Immovement Heln	
PROCESS DATA	M ASSESSMENT	VEMENT
Process Executions O Metri	ric Data	
Pro. RecRecSel □ 25CA ℓ 25CA ℓ 25CA ℓ 25CA ℓ 25CA ℓ 25CA ℓ 25CA ℓ 25CA ℓ 25CA ℓ 25CA ℓ 25CA ℓ 125CA ℓ 125CA ℓ 125CA ℓ 125CA ℓ 125CA ℓ 125CA ℓ 125CA ℓ 125CA ℓ 125CA ℓ 125CA ℓ 125CA ℓ 125CA ℓ 125CA ℓ 125CA ℓ 125CA ℓ 125CA ℓ 125 ℓ 126 ℓ 127 ℓ 128 ℓ 129 </th <th>Record Info Inputs Outputs Activities Roles Tools & Techniqu No Name Act_No C 1 System Tester 1,2 Perform</th> <th>es lescription Is System Tes</th>	Record Info Inputs Outputs Activities Roles Tools & Techniqu No Name Act_No C 1 System Tester 1,2 Perform	es lescription Is System Tes

Figure 117 Process Execution Record of Process Execution #1

SPC - AAT Workspace Assessment Proces	ss Improvement Help					
PROCESS DATA	M ASSESS	SMENT	ð	PROCES	S IMPROVEMENT	
Process Executions O Metric Process Execution Records Pro. Rec. Rec. Sel. Pro. Pro. Rec. Sel. Pro. Pro. Pr	Data Process Execution Reco Record Info Inputs	rd Detail Outputs Activities	Roles	Tools & T	echniques	
1 25 C.A 🖌 🖵 2 25 C.A 🖌	No	Name	Act	No	Description	
3 25 C.A 🗹	1	Microsoft Word	2		Word Document	
4 25 C.A 🗹 🔺	2	Microsoft Excel	2		Excel Sheet	×
6 25 C.A 🗹	3	Internet Explorer	1		Web Browser	
7 25 C.A 🗹 💙	4	CA Harvest	1		Configuration Manag	J
8 25 CA V 9 25 CA V 10 25 CA V 11 25 CA V 13 25 CA V 14 25 CA V 15 25 CA V 16 25 CA V 17 26 CA V 18 25 CA V					Save Executio	n Record

Figure 118 Process Execution Record of Process Execution #1

👙 SPC - AAT		- • •
Workspace Assessment Proc	ess Improvement Help	
PROCESS DATA	M ASSESSMENT	PROCESS IMPROVEMENT
Process Executions O Metr Process Execution Records Pro. Rec. Rec. Sel. 2 25. CA. 4 2 5. CA. 4 2 5. CA. 4 2 5. CA. 4 2 5. CA. 4 2 5. CA. 4 2 5. CA. 4 2 5. CA. 4 2 5. CA. 4 2 5. CA. 4 2 5. CA. 4 2 5. CA. 4 1 2 5. CA. 4	ic Data Process Execution Record Detail Record Info Inputs Outputs Activities Role Process Execution No: 2 Recorded On: 25.Haz.2007 Recorded By: C.ALTUN	es Tools & Techniques

Figure 119 Process Execution Record of Process Execution #2

SPC - AAT Workspace Assessment Proc	ess Improvement Help		
PROCESS DATA	ASSESSMENT		PROCESS IMPROVEMENT
Process Executions O Metri Process Execution Records ProRecSel	r Data Process Execution Record Deta Record Info Inputs Out;	il outs Activities Roles	Tools & Techniques
1 25 C.A 🖌 🖵 2 25 C.A 🖌	No	Name	Description
3 25 CA V 4 25 CA V 5 25 CA V 6 25 CA V 7 25 CA V 9 25 CA V 9 25 CA V 10 25 CA V 11 25 CA V 12 25 CA V 13 26 CA V 14 25 CA V 15 25 CA V 16 25 CA V 17 25 CA V 18 26 CA V	1 2 3 	SRS UC_NODE STC	Software Requirements Spec Use Case Excel Sheet - NODE Software Test Case Document

Figure 120 Process Execution Record of Process Execution #2

sPC - AAT Norkspace Assessment Pro	cess Improvement Help
PROCESS DATA	M ASSESSMENT
Process Executions O Met Process Execution Records	ic Data
ProRecSel	Record Info Inputs Outputs Activities Roles Tools & Techniques
1 25 C.A 🖌 📙	No Name Description
3 25 C.A 🗹	1 UC_NODE Use Case Excel Sheet - NODE
4 25 C.A 🗹 🔺	2 STC Software Test Case Document
6 25 C.A 🖌	
7 25 C.A 🗹 🔻	
8 25 C.A 🖌 🤌	
10 25 C.A 🗹 🗮	
11 25 C.A 🗹	
12 25 U.A V 13 25 C.A. V	
14 25 C.A 🖌	
15 25 C.A 🗹	· · · · · · · · · · · · · · · · · · ·
16 25 C.A V	
18 25 C.A 🖌	Save Execution Record



SPC - AAT Workspace Assessment Proce	ess Improvement Help			
PROCESS DATA	ASSESSMENT		PROCESS IMPROVEMENT	
Process Executions O Metri Process Execution Records ProRecRecSel 1 25CA	c Data Process Execution Record Deta Record Info Inputs Outp	il outs Activities Roles	Tools & Techniques	
2 25 C.A 🗹	No	Name	Description	
3 22 CA 𝒴 4 25 CA 𝒴 6 25 CA 𝒴 8 25 CA 𝒴 9 25 CA 𝒴 10 25 CA 𝒴 11 25 CA 𝒴 12 25 CA 𝒴 13 25 CA 𝒴 14 25 CA 𝒴 15 25 CA 𝒴 16 25 CA 𝒴 18 25 CA 𝒴		Run Test Case	Run Test Case	The second secon

Figure 122 Process Execution Record of Process Execution #2

👙 SPC - AAT Morksnace Assessment Dro	case Improvement Help	
PROCESS DATA	M ASSESSMENT	PROCESS IMPROVEMENT
Process Executions Me Process Execution Records Process Execution Records	ric Data	
1 25 CA ℓ 2 25 CA ℓ 2 25 CA ℓ 4 25 CA ℓ 5 25 CA ℓ 8 25 CA ℓ 8 25 CA ℓ 9 25 CA ℓ 10 25 CA ℓ 11 25 CA ℓ 12 25 CA ℓ 13 25 CA ℓ 14 25 CA ℓ 15 25 CA ℓ 16 25 CA ℓ 17 25 CA ℓ 18 25 CA ℓ	Necra into inputs Outputs Activities R No Name 1	Act_No Description Performs System Tes

Figure 123 Process Execution Record of Process Execution #2

SPC - AAT Workspace Assessment Prod	cess Improvement Help				
PROCESS DATA	M ASSES	SMENT		PROCESS IMPROVEME	NT
Process Executions Metr Process Execution Records ProRecRecSel	ric Data Process Execution Reco Record Info Inputs	ord Detail	s Roles	Tools & Techniques	
2 25 C.A 🖌	No	Name	Ad	t_No Descrip	ition 📑 🔶 📥
3 25 C.A 🗹 📫	1	Internet Explorer	1	Web Browser	
5 25 C.A 🖌 🔺	2	Microsoft Word	1	Word Docume	ent 🛛 🗶
6 25 CA. <i>v</i> 7 25 CA. <i>v</i> 9 25 CA. <i>v</i> 10 25 CA. <i>v</i> 11 25 CA. <i>v</i> 13 25 CA. <i>v</i> 13 25 CA. <i>v</i> 14 25 CA. <i>v</i> 15 25 CA. <i>v</i> 16 25 CA. <i>v</i> 17 25 CA. <i>v</i> 18 25 CA. <i>v</i> 18 25 CA. <i>v</i>		mitroson Exce		Save Ex	ecution Record

Figure 124 Process Execution Record of Process Execution #2

👙 SPC - AAT		
Workspace Assessment Proc	ess Improvement Help	
PROCESS DATA	ASSESSMENT	PROCESS IMPROVEMENT
● Process Executions ● Metr Process Execution Records Pro. Rec. Rec. Set. 1 1 25 CA ¢ 1 2 3 25 CA ¢ 1 1 4 25 CA ¢ 1 1 5 25 CA ¢ 1 1 1 8 25 CA ¢ 1 1 1 1 8 25 CA ¢ 1	Process Execution Record Detail	es Tools & Techniques

Figure 125 Process Execution Record of Process Execution #3

SPC - AAT Workspace Assessment Proces	ss Improvement Help		
PROCESS DATA	M ASSESSMEN	r 🔤	PROCESS IMPROVEMENT
Process Executions Metric I Process Execution Records Pro. Rec. Rec. Sel. Pro. Rec. Rec. Sel. Pro. Rec. Rec. Rec. Pro. Rec. Rec. Rec. Pro. Rec. Rec. Pro. Rec. Rec. Rec. Rec. Pro. Rec. Rec. Pro. Rec. Rec. Pro. Rec. Rec. Pro. Rec. Rec. Pro. Rec. Rec. Pro. Rec. Rec. Pro. Rec. Rec. Pro. Rec. Rec. Pro. Rec. Pro. Rec. Rec. Pro. Pro. Rec. Pro. Pro. Rec. Pro. Pr	Data Process Execution Record Def Record Info Inputs Ou	ail tputs Activities Rol	les Tools & Techniques
1 25 C.A 🖌 📙	No	Name	Description
3 25 C.A 🖌 🗶	1	SRS	Software Requirements Spec
4 25 C.A 🗹	2	UC_NODE	Use Case Excel Sheet - NODE 🙀
6 25 C.A 🖌	3	STC	Software Test Case Document
7 25 C.A 🗹 💙 8 25 C.A 🗹			
9 25 C.A ☑ 2+			
10 25 C.A 🖌			
12 25 C.A 🗹			
13 25 C.A 🗹			
15 25 C.A 🗹			-
16 25 C.A 🗹			
17 25 C.A 🗹 18 25 C.A 🗹			Save Execution Record

Figure 126 Process Execution Record of Process Execution #3

🐇 SPC - AAT Workspace Assessment Prod	ess Improvement Help
	M 🔊
PROCESS DATA	M ASSESSMENT
Process Executions O Metr Process Execution Records	c Data Process Execution Record Detail
ProRecSel	Record Info Inputs Outputs Activities Roles Tools & Techniques
1 25 CA ℓ 2 25 CA ℓ 3 25 CA ℓ 4 25 CA ℓ 8 25 CA ℓ 9 25 CA ℓ 9 25 CA ℓ 10 25 CA ℓ 11 25 CA ℓ 12 25 CA ℓ 13 25 CA ℓ 14 25 CA ℓ	No Name Description 1 UC_NODE Use Case Excel Sheet - NODE 2 STC Software Test Case Document
15 25 CA Image: CA 16 25 CA Image: CA 17 25 CA Image: CA 18 25 CA Image: CA	Save Execution Record

Figure 127 Process Execution Record of Process Execution #3

SPC - AAT Workspace Assessment Proce	ess Improvement Help			
PROCESS DATA	M ASSESSMEN	IT	PROCESS IMPROVEMENT	
Process Executions O Metrie Process Execution Records ProRecRecSel 1 25CA	C Data Process Execution Record De Record Info Inputs 0	tail utputs Activities Ro	les Tools & Techniques	
2 25 C.A 🖌 💌	N0	Name Save Test Result	Description Save Test Result	- C F
4 25 C.A 🖌	2	Run Test Case	Run Test Case	
5 25 C.A 🗹 🦰	3	Create Test Package		
7 25 CA V 8 25 CA V 10 25 CA V 11 25 CA V 12 25 CA V 13 25 CA V 14 25 CA V 15 25 CA V 16 25 CA V 17 25 CA V 18 25 CA V			Save Executi	on Record

Figure 128 Process Execution Record of Process Execution #3

SPC - AAT	ass inversement Help
PROCESS DATA	M ASSESSMENT
Process Executions O Metr Process Execution Records	ic Data Process Execution Record Detail
Pro. Rec. Rec. Sel. 1 1 25 CA ℓ 2 25 CA ℓ 3 25 CA ℓ 4 25 CA ℓ 7 25 CA ℓ 8 25 CA ℓ 9 25 CA ℓ 9 25 CA ℓ 10 25 CA ℓ 11 25 CA ℓ 12 25 CA ℓ 13 25 CA ℓ 14 25 CA ℓ 15 25 CA ℓ 16 25 CA ℓ 18 25 CA ℓ 18 25 CA ℓ	Record Info Imputs Outputs Activities Roles Tools & Techniques No Name Act_No Description 1 System Tester 1 Performs System Test Image: Comparison of the system Test Image: Comparison of the system Tester 1 Performs System Test Image: Comparison of the system Test Image: Comparison of the system Tester 1 Source Execution Record

Figure 129 Process Execution Record of Process Execution #3

SPC - AAT Workspace Assessment Proce	ess Improvement Help				
	<u>ک</u> کے (2			
PROCESS DATA	M ASSES	SMENT		PROCESS IMPROVE	MENT
Process Executions Metri	c Data				
Process Execution Records	Process Execution Reco	rd Detail			
Pro Rec Sel	Record Info Inputs	Outputs Activities	s Roles	Tools & Techniques	
2 25 C.A 🖌	No	Name	Act	LNo Des	cription 🛛 🕞 📥
3 25 C.A 🖌	1	Internet Explorer	1	Web Brow	rser 📃
4 25 C.A 🗹	2	Microsoft Word	1	Word Doci	ument
6 25 CA.	3	Microsoft Excel	1	Excel Shee	et 📃 🖃 🔳
7 25 C.A 🗹 🔻	4	CA Harvest	1	Configurat	tion Manag
8 25 C.A					
9 25 C.A. 🗹 💆					
11 25 C.A 🗹					
12 25 C.A 🗹					
13 25 C.A 🗹					
15 25 C.A					
16 25 C.A 🖌					
17 25 C.A 🗹 18 25 C.A 🗹				Save	Execution Record

Figure 130 Process Execution Record of Process Execution #3

👙 SPC - AAT	
Workspace Assessment Pro	cess Improvement Help
PROCESS DATA	ASSESSMENT
Process Executions Met Process Execution Records	ric Data
ProRec. Rec. Set. 1 25CA 𝒴 2 25CA 𝒴 3 25CA 𝒴 4 25CA 𝒴 8 25CA 𝒴 9 25CA 𝒴 10 25CA 𝒴 11 25CA 𝒴 12 25CA 𝒴 11 25CA 𝒴 12 25CA 𝒴 13 25CA 𝒴 14 25CA 𝒴 15 25CA 𝒴 16 25CA 𝒴 17 25CA 𝒴 18 25CA 𝒴	Record Info Inputs Outputs Activities Roles Tools & Techniques Process Execution No: 4

Figure 131 Process Execution Record of Process Execution #4

SPC - AAT Workspace Assessment Proce	ess Improvement Help		
PROCESS DATA	M ASSESSMENT		PROCESS IMPROVEMENT
Process Executions Metri Process Execution Records ProRecRecSel ProRecRecSel ProRecRecSel ProRecRecSel ProRecRecRecRecRecRecRecR	c Data Process Execution Record Deta Record Info Inputs Out;	il buts Activities Roles	Tools & Techniques
1 25 CA V 2 25 CA V 3 25 CA V 4 25 CA V 5 25 CA V 8 25 CA V 9 25 CA V 10 25 CA V 11 25 CA V 12 25 CA V 13 25 CA V 14 25 CA V 15 25 CA V 16 25 CA V 16 25 CA V 17 25 CA V 18 25 CA V	No 1 2 3 3	Name SRS UC_NODE STC	Description Software Requirements Spec Use Case Excel Sheet-NODE Software Test Case Document

Figure 132 Process Execution Record of Process Execution #4

Vorkspace Assessment Pro	cess Improvement Help			
	💅 놀 💡			
PROCESS DATA	M ASSESSMENT		PROCESS IMPROVE	MENT
Process Executions O Me Process Execution Records 1	ric Data	ail		
ProRecSel	Record Info Inputs Out	puts Activities I	Roles Tools & Techniques	
1 25 C.A V 2 25 C.A V	No	Name	Descrip	tion
4 25 C.A V 5 25 C.A V	2	STC	Software Test Cas	e Document
6 25 CA V 7 25 CA V 8 25 CA V 9 25 CA V 10 25 CA V 11 25 CA V 12 25 CA V 13 25 CA V				
14 25 C.A ⊭ 15 25 C.A ⊭ 16 25 C.A ⊭				-
17 25 C.A ⊭ 18 25 C.A ⊭			Save	Execution Record

Figure 133 Process Execution Record of Process Execution #4

SPC - AAT Workspace Assessment Proce	ess Improvement Help			
PROCESS DATA	ASSESSMENT		PROCESS IMPROVEMENT	
Process Executions Metri Process Execution Records ProRecRecSel	c Data Process Execution Record Deta Record Info Inputs Out	il outs Activities Rol	es Tools & Techniques	
1 25 C.A 🗹 💾	No	Name	Description	
3 25 C.A 🗹	1	Save Test Result	Save Test Resut	
4 25 C.A 🖌	2	Run Test Case	Run Test Case	×
5 25 C.A 🗹 🦰	3	Create Test Package		
7 25 C.A 🗹 🔻				
8 25 C.A 🗹				
10 25 C.A 🔽				
11 25 C.A 🖌				
12 25 C.A 🗹				
14 25 C.A 🗹				
15 25 C.A 🖌				-
16 25 C.A	24			
18 25 C.A 🗹			Save Execution	Record

Figure 134 Process Execution Record of Process Execution #4

👙 SPC - AAT	cess Improvement Help	
PROCESS DATA	ASSESSMENT	PROCESS IMPROVEMENT
Process Executions Met Process Execution Records Pro Rec Rec Set	ric Data Process Execution Record Detail Record Detail	Tasla & Taskajanga
125CA ℓ 25CA ℓ 225CA ℓ 225CA ℓ 425CA ℓ 525CA ℓ 625CA ℓ 825CA ℓ 925CA ℓ 925CA ℓ 1025CA ℓ 1125CA ℓ 1235CA ℓ 125CA ℓ 125CA ℓ 125CA ℓ 125CA ℓ 125CA ℓ 125CA ℓ 1325CA ℓ 1525CA ℓ 1625CA ℓ 1725CA ℓ 1825CA ℓ	No Name .	Act No Description Performs System Tes.

Figure 135 Process Execution Record of Process Execution #4

SPC - AAT Workspace Assessment Proce	ess Improvement Help				
PROCESS DATA	M ASSES	SMENT		PROCESS IMPROV	EMENT
Process Executions Metri Process Execution Records ProRecRecSel	c Data Process Execution Reco Record Info Inputs	rd Detail	s Roles	Tools & Techniques	
1 25 C.A 🗹	No	Name	Ac	t No Des	scription
3 25 C.A 🖌	1	Internet Explorer	1	Web Brow	/ser
4 25 C.A 🖌	2	Microsoft Word	1	Word Doc	ument 🖌
6 25 C.A	3	Microsoft Excel	1	Excel She	et 📃 🗮 🔳
7 25 C.A 🗹 🔻	4	CA Harvest	1	Configura	tion Manag
8 25 CA (r) 9 25 CA (r) 10 25 CA (r) 11 25 CA (r) 12 25 CA (r) 13 25 CA (r) 14 25 CA (r) 15 25 CA (r) 16 25 CA (r) 18 25 CA (r)				Savi	e Execution Record

Figure 136 Process Execution Record of Process Execution #4

🖢 SPC - AAT	
Workspace Assessment Pro	ocess Improvement Help
PROCESS DATA	M ASSESSMENT
Process Executions O Me	tric Data
Process Execution Records 1 25CA ✓ 2 25CA ✓ 3 25CA ✓ 4 25CA ✓ 5 25CA ✓ 6 25CA ✓ 9 25CA ✓ 9 25CA ✓ 10 25CA ✓ 11 25CA ✓ 12 25CA ✓ 13 25CA ✓ 14 25CA ✓ 15 25CA ✓ 16 25CA ✓ 16 25CA ✓ 17 25CA ✓	Process Execution Record Detail Record Info Inputs Outputs Activities Roles Tools & Techniques Process Execution No: 6 Recorded On: 25 Haz 2007 Recorded By: CALTUN Process Execution Questionnaire>>

Figure 137 Process Execution Record of Process Execution #5

SPC - AAT Workspace Assessment Proce	ess Improvement Help		
PROCESS DATA	M ASSESSMENT	ł	PROCESS IMPROVEMENT
Process Executions O Metri Process Execution Records ProRecRecSel	c Data Process Execution Record Detail Record Info Inputs Output	its Activities Roles	Tools & Techniques
1 25 C.A 🖌	No	Name	Description
3 20 CA ℓ 4 25 CA ℓ 6 25 CA ℓ 7 25 CA ℓ 9 25 CA ℓ 10 25 CA ℓ 11 25 CA ℓ 13 25 CA ℓ 13 25 CA ℓ 14 25 CA ℓ 15 25 CA ℓ 16 25 CA ℓ 18 25 CA ℓ	3	STC	Software Test Case Document

Figure 138 Process Execution Record of Process Execution #5

👙 SPC - AAT Workspace Assessment Pro	cess Improvement Help		
PROCESS DATA	ASSESSMENT	1	PROCESS IMPROVEMENT
Process Executions O Me	tric Data		
Process Execution Records	Process Execution Record Deta	il	
ProRecSel	Record Info Inputs Out	outs Activities Roles	Tools & Techniques
2 25 C.A 🗹 🏹	No	Name	Description 📑 🔶
3 25 C.A 🗹	1	UC_NODE	Use Case Excel Sheet - NODE
4 25 C.A. V	2	STC	Software Test Case Document
6 25 C.A 🖌			
7 25 C.A 🗹 🔻			
8 25 C.A 🗹			
10 25 C.A			
11 25 C.A 🖌			
12 25 C.A 🗹			
13 25 C.A M			
15 25 C.A V			
16 25 C.A 🖌	<u></u>		`
17 25 C.A 🗹			Save Execution Record
18 25 U.A 🗹			Caro Encoudon naciona

Figure 139 Process Execution Record of Process Execution #5

SPC - AAT Workspace Assessment Proc	ess Improvement Help)		
PROCESS DATA	M ASSESSM	ENT	PROCESS IMPROVEMENT	
Process Executions Metri Process Execution Records ProRecRecSel	c Data Process Execution Record Record Info Inputs	Detail Outputs Activities Ro	oles Tools & Techniques	
1 25 C.A 🗹 💾	No	Name	Description	
3 25 C.A 🗹 본	1	Save Test Result	Save Test Resut	
4 25 C.A 🗹	2	Run Test Case	Run Test Case	×
6 25 CA	3	Create Test Package		
7 25 C.A 🗹 🔻				
8 25 C.A 🗹				
10 25 CA				
11 25 C.A 🖌				
12 25 C.A 🗹				
14 25 C.A 🖌				
15 25 C.A 🖌				-
16 25 C.A 🖌				
18 25 C.A			Save Execution	on Record
			ha	

Figure 140 Process Execution Record of Process Execution #5

SPC - AAT	ess Imnrovement Heln				- • ×
		?			
PROCESS DATA	M ASSESS	MENT	Ð	PROCESS IMPROVEMENT	
Process Executions Metr Process Execution Records Dro Doo Doo Col	Process Execution Reco	d Detail			
1 2.5 (CA ℓ') 2 2.5 (CA ℓ') 3 2.5 (CA ℓ') 4 2.5 (CA ℓ') 6 2.5 (CA ℓ') 8 2.5 (CA ℓ') 9 2.5 (CA ℓ') 10 2.5 (CA ℓ') 11 2.5 (CA ℓ') 12 2.5 (CA ℓ') 13 2.5 (CA ℓ') 14 2.5 (CA ℓ') 15 2.5 (CA ℓ') 12 2.5 (CA ℓ') 13 2.5 (CA ℓ')		Name Name System Tester	Act 1	No Description Performs System Tr	
10 23 C.A V 17 25 C.A V 18 25 C.A V				Save Executio	on Record

Figure 141 Process Execution Record of Process Execution #5

SPC - AAT Workspace Assessment Proce	ess Improvement Help	2				
PROCESS DATA Process Executions Metri	M ASSES	SMENT		PROCES	S IMPROVEMENT	
Process Execution Records ProRecRecSel 1 25CA 2 25CA	Process Execution Reco Record Info Inputs	rd Detail Outputs Activities Name Internet Explorer	s Roles	Tools & T	echniques Description Web Browser	
4 25 C A ♥ 5 25 C A ♥ 6 25 C A ♥ 7 25 C A ♥ 8 25 C A ♥	2 3 4	Microsoft Word Microsoft Excel CA Harvest	1 1 1		Word Document Excel Sheet Configuration Man	ag
9 25 CA ♥ 10 25 CA ♥ 11 25 CA ♥ 12 25 CA ♥ 13 25 CA ♥ 14 25 CA ♥ 15 25 CA ♥ 16 25 CA ♥ 17 25 CA ♥ 18 25 CA ♥					Save Executi	• Record

Figure 142 Process Execution Record of Process Execution #5

👙 SPC - AAT		
Workspace Assessment Proc	ess Improvement Help	
PROCESS DATA	ASSESSMENT	PROCESS IMPROVEMENT
Process Executions O Metr Process Execution Records Pro. Rec. Rec. Sel. 1 25. CA. 4 25. CA. 4 25. CA. 4 25. CA. 4 25. CA. 4 25. CA. 4 25. CA. 4 12 5. CA. 4 12 5. CA. 4 12 5. CA. 4 12 5. CA. 1 12 5. CA. 1 12 5. CA. 1 12 5. CA. 1 12 5. CA. 1 12 5. CA. 1 12 5. CA. 1 12 5. CA. 1 12 5. CA. 1 12 5. CA. 1 12 5. CA. 1 12 5. CA. 1 12 5. CA. 1 12 5. CA. 1 12 5. CA. 1 12 5. CA. 1	rc Data Process Execution Record Detail Record Info Imputs Outputs Activities Role Process Execution No: 6 Recorded On: 25.Haz.2007 Recorded By: C.ALTUN	s Tools & Techniques

Figure 143 Process Execution Record of Process Execution #6

SPC - AAT Workspace Assessment Proces	ss Improvement Help		
PROCESS DATA	M ASSESSM	IENT	PROCESS IMPROVEMENT
Process Executions Metric Process Execution Records ProRec	Data Process Execution Record Record Info Inputs	Detail Outputs Activities Ro	les Tools & Techniques
1 25 C.A	No	Name	Description
3 25 C.A 🗹 👗	1	SRS	Software Requirements Spec
4 25 C.A 🗹 🔼	2	UC_NODE	Use Case Excel Sheet - NODE 🙀
6 25 CA	3	STC	Software Test Case Document
7 25 CA. ⊭ 8 25 CA. ⊭ 9 25 CA. ⊭ 10 25 CA. ⊭ 11 25 CA. ⊭ 12 25 CA. ⊭ 13 25 CA. ⊭ 14 25 CA. ⊭ 15 25 CA. ⊭ 16 25 CA. ⊭ 17 25 CA. ⊭ 18 25 CA. ⊭			Save Execution Record

Figure 144 Process Execution Record of Process Execution #6

∯ SPC - AAT Workspace Assessment Proc	ess Improvement Help		
	<u> </u>		
PROCESS DATA	M ASSESSMENT		PROCESS IMPROVEMENT
Process Executions Metr Drocess Execution Records	c Data		
ProRecSel	Record Info Inputs Output	its Activities Roles	Tools & Techniques
1 25 C.A 🖌	No	Name	Description
3 25 C.A ⊮ 4 25 C.A ⊮	2	STC	Software Test Case Document
5 25 CA W 6 25 CA W 7 25 CA W 9 25 CA W 10 25 CA W 11 25 CA W 13 25 CA W 13 25 CA W			
14 25 C.A ♥ 15 25 C.A ♥ 16 25 C.A ♥			
17 25 C.A V 18 25 C.A V			Save Execution Record

Figure 145 Process Execution Record of Process Execution #6

SPC - AAT Workspace Assessment Proce	ess Improvement Help		
PROCESS DATA	ASSESSMENT		PROCESS IMPROVEMENT
Process Executions Metri Process Execution Records ProRecRecSel ProRecRecSel	r Data Process Execution Record Detai Record Info Inputs Outp	I uts Activities Roles	Tools & Techniques
1 25 C.A	No	Name	Description
3 25 C.A 🗹 🗶	1	Save Test Result	Save Test Resut
4 25 CA 𝒴 5 25 CA 𝒴 6 25 CA 𝒴 7 25 CA 𝒴 8 25 CA 𝒴 10 25 CA 𝒴 11 25 CA 𝒴 12 25 CA 𝒴 13 25 CA 𝒴 14 25 CA 𝒴 16 25 CA 𝒴 18 25 CA 𝒴	2	Run Test Case	Save Test Result to STC and

Figure 146 Process Execution Record of Process Execution #6

SPC - AAT	sess Imnrovement Heln			×
		2		
PROCESS DATA	M ASSESS	MENT	PROCE	SS IMPROVEMENT
Process Executions Metr Process Execution Records	Process Execution Recor	d Detail	Y Y	
1 25 CA. v 2 25 CA. v 3 25 CA. v 4 25 CA. v 5 25 CA. v 6 25 CA. v 8 25 CA. v 9 25 CA. v 9 25 CA. v 10 25 CA. v 11 25 CA. v 12 25 CA. v 13 25 CA. v 14 25 CA. v 15 25 CA. v 16 25 CA. v 18 25 CA. v		Name Name System Tester 1	Act No	Description Performs System Tes
17 25 C.A 🗹 18 25 C.A 🗹				Save Execution Record

Figure 147 Process Execution Record of Process Execution #6

SPC - AAT Workspace Assessment Proce	ss Improvement Help					
PROCESS DATA	M ASSESS	MENT		PROCESS	IMPROVEMENT	
Process Executions Metric Process Execution Records ProRecRecSel	Data Process Execution Recor Record Info Inputs	d Detail	Roles	Tools & Te	chniques	
1 25 C.A ⊮ ⊨ 2 25 C.A ⊮	No	Name	A	:t_No	Description	
3 25 C.A 🖌 🎽	1	Internet Explorer	1		Web Browser	
4 25 C.A	2	Microsoft Word	1		Word Document	×
6 25 C.A 🖌	3	Microsoft Excel	1		Excel Sheet	
7 25 CA 𝒴 8 25 CA 𝒴 9 25 CA 𝒴 10 25 CA 𝒴 11 25 CA 𝒴 12 25 CA 𝒴 13 25 CA 𝒴 14 25 CA 𝒴 15 25 CA 𝒴 16 25 CA 𝒴 17 25 CA 𝒴 18 25 CA 𝒴					Save Executi	▼ on Record

Figure 148 Process Execution Record of Process Execution #6

👙 SPC - AAT		- • •
Workspace Assessment Proc	ess Improvement Help	
	🏂 婱	
PROCESS DATA	ASSESSMENT	PROCESS IMPROVEMENT
● Process Executions ● Metr Process Execution Records Process Execution Records Process Execution Records Process Execution Records Process Execution Records Process Execution Records Process Execution Records 2 25 CA ¢ 3 25 CA ¢ 6 25 CA ¢ 9 25 CA ¢ 10 25 CA ¢ 11 25 CA ¢ 12 25 CA ¢ 13 25 CA ¢ 15 26 CA ¢ 15 25 CA ¢ 16 25 CA ¢ 17 25 CA ¢ 18 25 CA ¢	ic Data Process Execution Record Detail Record Info Inputs Outputs Activities Rol Process Execution No: 7 Recorded On: 25.Haz.2007 Recorded By: CALTUN	es Tools & Techniques

Figure 149 Process Execution Record of Process Execution #7

SPC - AAT Workspace Assessment Proces	ss Improvement Help)	
PROCESS DATA	M ASSESSM	ENT	PROCESS IMPROVEMENT
Process Executions O Metric Process Execution Records ProRecRecSel	Data Process Execution Record Record Info Inputs	Detail Outputs Activities Ro	les Tools & Techniques
1 25 C.A 🖌 📙 2 25 C.A 🖌	No	Name	Description
3 25 C.A 🖌 🗶	1	SRS	Software Requirements Spec
4 25 C.A 🖌 🔺	2	UC_NODE	Use Case Excel Sheet - NODE
6 25 C.A 🗹	3	STC	Software Test Case Document
7 25 C.A 🖌 🗸			
9 25 C.A 🗹 🤱			
10 25 C.A 🗹 🧮			
11 25 C.A 🖌			
13 25 C.A 🖌			
14 25 C.A			
16 25 C.A			
17 25 C.A ⊭ 18 25 C.A ⊭			Save Execution Record

Figure 150 Process Execution Record of Process Execution #7

sPC-AAT Norkspace Assessment P	cess Improvement Help
PROCESS DATA	M ASSESSMENT
Process Executions O M	tric Data
Process Execution Records	Process Execution Record Detail
ProRecRecSel	Record Info Inputs Outputs Activities Roles Tools & Techniques
1 25 C.A	No Name Description
3 25 C.A 🖌 📩	1 UC NODE Use Case Excel Sheet - NODE
4 25 C.A 🖌 👗	2 STC Software Test Case Document
5 25 C.A 🗹 📥	
7 25 C.A V	
8 25 C.A 🖌	
9 25 C.A 🗹 🛃	
10 25 C.A V	
12 25 C.A 🗹	
13 25 C.A 🖌	
14 25 C.A V	
16 25 C.A 🖌	
17 25 C.A 🖌	Saus Execution Report
18 25 C.A 🗹	Save Execution Record

Figure 151 Process Execution Record of Process Execution #7

SPC - AAT Workspace Assessment Proce	ess Improvement Help			
PROCESS DATA	M ASSESSMENT		PROCESS IMPROVEMENT	
● Process Execution ● Metric Process Execution Records	Process Execution Record Deta Record Info Inputs Out No 2 3	ill puts Activities Rol Save Test Result Run Test Case Create Test Package	es Tools & Techniques Description Save Test Resut Run Test Case	

Figure 152 Process Execution Record of Process Execution #7

👙 SPC - AAT	
PROCESS DATA	ASSESSMENT
Process Executions Met Process Execution Records Pro Par Par Sal	Process Execution Record Detail Process Execution Record Detail Record Info Contract Contract Contractions
1 25 CA ℓ 2 25 CA ℓ 2 25 CA ℓ 2 25 CA ℓ 4 25 CA ℓ 6 25 CA ℓ 7 25 CA ℓ 8 25 CA ℓ 10 25 CA ℓ 11 25 CA ℓ 12 25 CA ℓ 13 25 CA ℓ 14 25 CA ℓ 15 25 CA ℓ 16 25 CA ℓ 17 25 CA ℓ 18 25 CA ℓ	No Name Act_No Description 1 System Tester 1 Performs System Test Image: System Tester

Figure 153 Process Execution Record of Process Execution #7

SPC - AAT Workspace Assessment Pro	cess Improvement Help	2			
PROCESS DATA Process Executions Metri	M ASSES	SMENT		PROCESS IMPROVEMENT	
Process Execution Records	Process Execution Reco Record Info Inputs	ord Detail	s Roles	Tools & Techniques	
1 2.25 CA ℓ 2 25 CA ℓ 3 25 CA ℓ 4 25 CA ℓ 5 25 CA ℓ 6 25 CA ℓ 8 25 CA ℓ 9 25 CA ℓ 10 25 CA ℓ 12 25 CA ℓ 12 25 CA ℓ 13 25 CA ℓ 14 25 CA ℓ 15 25 CA ℓ 16 25 CA ℓ 17 25 CA ℓ 18 25 CA ℓ	No 1 2 3 4	Name Internet Explorer Microsoft Word Microsoft Excel CA Harvest	Act 1 1 1 1	No Description Web Browser Word Document Excel Sheet Configuration Man	agv

Figure 154 Process Execution Record of Process Execution #7

👙 SPC - AAT	
Workspace Assessment Pro	cess Improvement Help
PROCESS DATA	ASSESSMENT
Process Executions O Met Process Execution Records	ric Data
Pro RecRecSet 1 25CAV 2 25CAV 4 25CAV 5 25CAV 6 25CAV 8 25CAV 9 25CAV 10 25CAV 11 25CAV 12 25CAV 13 25CAV 14 25CAV 15 25CAV 16 25CAV 17 25CAV 16 25CAV 18 25CAV 19 25CAV	Record Info Inputs Outputs Activities Roles Tools & Techniques Process Execution No: 8 Recorded On: 25 Haz 2007 10 Recorded By: C ALTUN Process Execution Questionnaire>> Process Execution Record Save Execution Record

Figure 155 Process Execution Record of Process Execution #8

SPC - AAT Workspace Assessment Proces	ss Improvement Help	2	
PROCESS DATA	M ASSESSI	MENT	PROCESS IMPROVEMENT
Process Executions Metric Process Execution Records ProRecRecSel	Data Process Execution Record Record Info Inputs	d Detail	oles Tools & Techniques
1 25 C.A ⊮ ⊨ 2 25 C.A ⊮	No	Name	Description
3 25 CA ∠ 4 25 CA ∠ 5 25 CA ∠ 8 25 CA ∠ 9 25 CA ∠ 10 25 CA ∠ 11 25 CA ∠ 12 25 CA ∠ 13 25 CA ∠ 14 25 CA ∠ 15 25 CA ∠ 16 25 CA ∠ 18 25 CA ∠ 18 25 CA ∠	1 2 3	SRS UC_NODE STC	Software Requirements Spec

Figure 156 Process Execution Record of Process Execution #8

g SPC - AAT Workspace Assessment Proc	ess Improvement Help
PROCESS DATA	M ASSESSMENT
Process Executions O Metri	c Data
ProRecRecSel	Process Execution record Detail Record Info Inputs Outputs Roles Tools & Techniques
1 25 C.A 🗹	No Name Description
3 25 C.A ∠ 4 25 C.A ∠	2 STC Software Test Case Document
5 25 CA ♥ 6 25 CA ♥ 8 25 CA ♥ 9 25 CA ♥ 10 25 CA ♥ 11 25 CA ♥	
12 25 CA 𝒴 13 25 CA 𝒴 14 25 CA 𝒴 15 25 CA 𝒴 16 25 CA 𝒴 17 25 CA 𝒴 18 25 CA 𝒴	Save Execution Record

Figure 157 Process Execution Record of Process Execution #8

SPC - AAT Workspace Assessment Proc	ess Improvement Help			
PROCESS DATA Process Executions O Metr Process Execution Records	ic Data	/\	PROCESS IMPROVEMENT	
ProRecSel	Record Info Inputs Outp	uts Activities Roles	Tools & Techniques	
1 20	No 1 2 3	Name Save Test Result Run Test Case Create Test Package	Description Save Test Resut Run Test Case	on Record

Figure 158 Process Execution Record of Process Execution #8

SPC - AAT	ess Improvement Help				- • ×
		?			
PROCESS DATA	M ASSESS	MENT	ð	PROCESS IMPROVEMENT	
Process Executions Metr Process Execution Records	ic Data	d Detail			
1 2.5 CA ℓ 2 2.5 CA ℓ 3 2.5 CA ℓ 4 2.5 CA ℓ 5 2.5 CA ℓ 6 2.5 CA ℓ 8 2.5 CA ℓ 9 2.5 CA ℓ 10 2.5 CA ℓ 11 2.5 CA ℓ 12 2.5 CA ℓ 13 2.5 CA ℓ 14 2.5 CA ℓ 15 2.5 CA ℓ		Name Name System Tester	Act_1	No Description Performs System	TesX
17 25 C.A 🗹 18 25 C.A 🗹				Save Execu	tion Record

Figure 159 Process Execution Record of Process Execution #8

SPC - AAT Workspace Assessment Proce	ess Improvement Help					
PROCESS DATA	M ASSES	SMENT		PROCES	S IMPROVEMENT	
Process Executions Metri Process Execution Records ProRecRecSel	c Data Process Execution Reco Record Info Inputs	ord Detail Outputs Activitie:	s Role:	s Tools & T	echniques	
1 25 C.A 🖌 🗖	No	Name	1	Act_No	Description	
3 25 C.A 🗹	1	Internet Explorer	1		Web Browser	
4 25 C.A 🗹 🔺	2	Microsoft Word	1		Word Document	×
6 25 C.A 🗹	3	Microsoft Excel	1		Excel Sheet	
7 25 C.A 🗹	4	CA Harvest	3		Configuration Manag	I
b 22 CA e/ g 25 CA e/ 10 25 CA e/ 11 26 CA e/ 13 25 CA e/ 14 25 CA e/ 15 25 CA e/ 16 25 CA e/ 17 26 CA e/ 18 25 CA e/					Save Execution	n Record

Figure 160 Process Execution Record of Process Execution #8

👙 SPC - AAT	
Workspace Assessment Pro	cess Improvement Help
PROCESS DATA	ASSESSMENT
Process Executions ○ Met Process Execution Records Pro. Rec. Rec. Set. 1 25 CA. ♥ 3 25 CA. ♥ 3 25 CA. ♥ 5 25 CA. ♥ 5 25 CA. ♥ 8 25 CA. ♥ 8 25 CA. ♥ 10 25 CA. ♥	ric Data Process Execution Record Detail Record Info Inputs Outputs Activities Roles Tools & Techniques Process Execution No: 9 Recorded On: 25 Haz 2007 CALTUN Process Execution Questionnaire>>
12 25 CA. V 13 25 CA. V 14 25 CA. V 15 25 CA. V 16 25 CA. V 17 25 CA. V 18 25 CA. V	Save Execution Record

Figure 161 Process Execution Record of Process Execution #9

SPC - AAT Workspace Assessment Proce	ss Improvement Help		
PROCESS DATA	M ASSESSMENT		PROCESS IMPROVEMENT
Process Executions O Metric Process Execution Records ProRecRecSet	Data Process Execution Record Detail Record Info Inputs Output	its Activities Roles	Tools & Techniques
1 25 C.A 🖌 🛁 2 25 C.A 🖌	No	Name	Description
3 25 CA ⊭ 5 25 CA ⊭ 6 25 CA ⊭ 8 25 CA ⊭ 9 25 CA ⊭ 10 25 CA ⊭ 11 25 CA ⊭ 13 25 CA ⊭ 13 25 CA ⊭ 15 25 CA ⊭ 16 25 CA ⊭ 17 25 CA ⊭ 17 25 CA ⊭ 18 25 CA ⊭ 19 25 CA ⊭ 19 25 CA ⊭ 10 25 CA ⊭ 10 25 CA ⊭ 10 25 CA ⊭ 10 25 CA ⊭ 10 25 CA ⊭ 10 25 CA ⊭ 10 25 CA ⊭		SRS JC_NODE STC	Software Requirements Spec

Figure 162 Process Execution Record of Process Execution #9

g SPC - AAT Workspace Assessment Proc	ess Improvement Help
PROCESS DATA	M ASSESSMENT
Process Executions O Metri	S Data
ProRecRecSel	Process Execution Record Detail Record Info Inputs Outputs Roles Tools & Techniques
1 25 C.A 🗹	No Name Description
3 25 C.A ⊮ 4 25 C.A ⊮	2 STC Software Test Case Document
5 25 CA ♥ 6 25 CA ♥ 7 25 CA ♥ 8 25 CA ♥ 10 25 CA ♥ 11 25 CA ♥ 11 25 CA ♥	
13 25 CA ✔ 14 25 CA ✔ 15 25 CA ✔ 16 25 CA ✔ 17 26 CA ✔ 18 25 CA ✔	Save Execution Record

Figure 163 Process Execution Record of Process Execution #9

SPC - AAT Workspace Assessment Pro	cess Improvement Help		
PROCESS DATA	M ASSESSMI	INT	PROCESS IMPROVEMENT
Process Executions Metr Process Execution Records Pro. Rec. Rec. Sel. Yee	ric Data Process Execution Record I Record Info Inputs	Detail Outputs Activities Ro	les Tools & Techniques
1 25 C.A	No	Name	Description
3 25 C.A 🖌	1	Save Test Result	Save Test Resut
4 25 C.A 🗹 🔼	2	Run Test Case	Run Test Case 🙀
5 25 C.A 🗹 🦰	3	Create Test Package	
7 25 C.A 🗹 🔻			
8 25 C.A 🗹			
10 25 C.A 🔽			
11 25 C.A 🖌			
12 25 C.A 🗹			
14 25 C.A 🖌			
15 25 C.A 🖌			
16 25 C.A			
18 25 C.A 🖌			Save Execution Record

Figure 164 Process Execution Record of Process Execution #9

🖢 SPC - AAT Morkenaco Assocsmont Dro	
PROCESS DATA	M ASSESSMENT
Process Executions Met Process Execution Records	ric Data
Pro. Rec. Set. 1 25 CA μ 2 25 CA μ 3 25 CA μ 4 25 CA μ 5 25 CA μ 6 25 CA μ 8 25 CA μ 9 25 CA μ 11 25 CA μ 12 25 CA μ 13 25 CA μ 14 25 CA μ 15 25 CA μ 16 25 CA μ 18 25 CA μ	Record Info Inputs Outputs Activities Roles Tools & Techniques No Name Act_No Description 1 System Tester 1 Performs System Tes Image: System Tester 1 System Tester Image: System Tester Image: System Tester 1 System Tester Image: System Tester Image: System Tester 1 System Tester Image: System Tester Image: System Tester 1 System Tester Image: System Tester Image: System Tester 1 System Tester Image: System Tester Image: System Tester 1 System Tester Image: System Tester Image: System Tester 1 System Tester Image: System Tester Image: System Tester 1 System Tester Image: System Tester Image: System Tester 1 System Tester Image: System Tester Image: System Tester 1 System Tester Image: System Tester Image: System Tester 1 System Tester Image: System Tester Image: System Tester 1 System Tester Image: System Tester

Figure 165 Process Execution Record of Process Execution #9

SPC - AAT Workspace Assessment Proce	ss Improvement Help					-
PROCESS DATA	M ASSES	SMENT	ł	PROCESS IMPRO	OVEMENT	
Process Executions O Metric Process Execution Records ProRecRecSel	Data Process Execution Reco Record Info Inputs	rd Detail	s Roles	Tools & Techniqu	es	
1 25 C.A 🖌 🛁 2 25 C.A 🖌	No	Name	Act	No D	escription	
3 25 C.A 🗹	1	Internet Explorer	1	Web Br	owser	
5 25 C.A 🖌 🔺	2	Microsoft Word	1	Word D	locument	_ X
6 25 C.A 🖌	3	Microsoft Excel	1	Excel S	heet	
7 25 C.A 🖌 🗸	4	CA Harvest	3	Cuniigi	irauun wanag	-
b 22 CA ℓ 9 26 CA ℓ 10 25 CA ℓ 12 25 CA ℓ 13 26 CA ℓ 15 25 CA ℓ 16 25 CA ℓ 17 26 CA ℓ 18 25 CA ℓ				Si	ave Execution F	Record

Figure 166 Process Execution Record of Process Execution #9

👙 SPC - AAT		
Workspace Assessment Pro	cess Improvement Help	
	🖻 📚 💡	
PROCESS DATA	ASSESSMENT	PROCESS IMPROVEMENT
● Process Executions ○ Met Process Execution Records Process Execution Records Pro. Rec. Rec. Set 1 1 25 CA ♥ 1 2 25 CA ♥ 1 4 25 CA ♥ 1 5 25 CA ♥ 1 6 25 CA ♥ 1 9 25 CA ♥ 1 10 25 CA ♥ 1 10 25 CA ♥ 1 11 25 CA ♥ 1 12 25 CA ♥ 1 13 25 CA ♥ 1 15 25 CA ♥ 1 16 25 CA ♥ 1 17 25 CA ♥ 1 18 25 CA ♥ 1	ric Data Process Execution Record Detail Record Info Inputs Outputs Activities Rol Process Execution No: 10 Recorded On: 25 Haz 2007 Recorded By: CALTUN	es Tools & Techniques

Figure 167 Process Execution Record of Process Execution #10

SPC - AAT Workspace Assessment Proce	ss Improvement Help		
PROCESS DATA	M ASSESSMENT		PROCESS IMPROVEMENT
Process Executions O Metric	: Data	-11	
Process Execution Records	Record Info Inputs Out	all Iputs Activities Rol	es Tools & Techniques
1 25 CA ✓ 2 25 CA ✓ 3 25 CA ✓ 4 25 CA ✓ 5 25 CA ✓ 8 25 CA ✓ 9 25 CA ✓ 10 25 CA ✓ 11 25 CA ✓ 12 25 CA ✓ 13 25 CA ✓ 14 25 CA ✓ 14 25 CA ✓ 15 25 CA ✓ 16 25 CA ✓	No 1 2 3	Name SRS UC_NODE STC	Description Software Requirements Spec Use Case Excel Sheet - NODE Software Test Case Document

Figure 168 Process Execution Record of Process Execution #10

SPC - AAT Workspace Assessment Proc	ess Improvement Help		
	🏂 婱 💡		
PROCESS DATA	M ASSESSMENT		PROCESS IMPROVEMENT
Process Executions Metri Process Execution Records ProRecRecSel Pro	ic Data Process Execution Record Deta Record Info Inputs Out	il auts Activities Role	s Tools & Techniques
1 25 C.A 🖌	No	Name	Description
3 25 C.A 🖌 본	1	UC_NODE	Use Case Excel Sheet - NODE
4 25 CA ♥ 5 25 CA ♥ 7 25 CA ♥ 8 25 CA ♥ 9 25 CA ♥ 10 25 CA ♥ 11 25 CA ♥ 13 25 CA ♥ 13 25 CA ♥ 14 25 CA ♥	2	STC	Software Test Case Document
16 25 C.A ♥ 17 25 C.A ♥ 18 25 C.A ♥			Save Execution Record

Figure 169 Process Execution Record of Process Execution #10

SPC - AAT Workspace Assessment Proce	ss Improvement Help			
Process DATA Process Executions Metric Process Execution Records Pro_Rec_Rec_Sel_ P	Data Process Execution Record Detai Record Info	il nuts Activities Role	Process IMPROVEMENT	
1 25 CA 𝒴 2 25 CA 𝒴 3 25 CA 𝒴 4 25 CA 𝒴 5 25 CA 𝒴 8 25 CA 𝒴 9 25 CA 𝒴 10 25 CA 𝒴 11 25 CA 𝒴 12 25 CA 𝒴 13 25 CA 𝒴 14 25 CA 𝒴 15 25 CA 𝒴 16 25 CA 𝒴 17 25 CA 𝒴 18 25 CA 𝒴 18 25 CA 𝒴 18 25 CA 𝒴 18 25 CA 𝒴 18 25 CA 𝒴 18 25 CA 𝒴 18 25 CA 𝒴 18 25 CA 𝒴 18 25 CA 𝒴		Name Save Test Result Run Test Case	Save Test Result Run Test Case Save Executi	on Record

Figure 170 Process Execution Record of Process Execution #10

SPC - AAT Workspace Assessment Proc	ess Improvement Help				- • • ×
	🏂 婱	2			
PROCESS DATA	M ASSESS	SMENT		PROCESS IMPROVEMENT	г
Process Executions O Metri Process Execution Records	c Data Process Execution Reco	rd Detail			
ProRecSel	Record Info Inputs	Outputs Activitie	s Roles	Tools & Techniques	
2 25 C A V 3 25 C A V 4 25 C A V 5 25 C A V 7 25 C A V 8 25 C A V 9 25 C A V 9 25 C A V 10 25 C A V 11 25 C A V 13 25 C A V 13 25 C A V	No 1	Name System Tester	Act	L <u>NO</u> Descriptic	nn m Tes

Figure 171 Process Execution Record of Process Execution #10

SPC - AAT	oss Improvoment - Help			
PROCESS DATA	M ASSESSMEN	IT	PROCESS IMPROVEME	NT
	Process Execution Record De Record Info Inputs O No 1 Inter 2 Micr 3 Micr	tail Atputs Activities R Name Explorer 1 soft Word 1 soft Excel 1	toles Tools & Techniques	tion
16 25 C.A ✔ 17 25 C.A ✔ 18 25 C.A ✔			Save Ex	ecution Record

Figure 172 Process Execution Record of Process Execution #10

SPC - AAT Workspace Assessment Pro	ocess Improvement Help	- • •
PROCESS DATA	A ASSESSMENT	
Process Executions Me Process Execution Records Process Execution Records Process Execution Records 1 2.5 CA. 25 CA. 25 CA. 25 CA. 25 CA. 25 CA. 25 CA. 25 CA. 25 CA. 25 CA. 25 CA. 25 CA. 25 CA. 25 CA. 25 CA. 12 CA. 12 CA. 11 25 CA.	tric Data Process Execution Record Detail Record Info Inputs Outputs Activities Roles Tools & Techniques Process Execution No: 11 Recorded On: 25.Haz.2007 Recorded By: C.ALTUN Process Execution Questi Save Execution	onnaire>>

Figure 173 Process Execution Record of Process Execution #11

SPC - AAT Workspace Assessment Process	ss Improvement Help				
PROCESS DATA	M ASSE	SSMENT		PROCESS IMPROVEMENT	
Process Executions Metric Process Execution Records	Data Process Execution Rec	cord Detail			
ProRecRecSel	Record Info Input	s Outputs A	Activities Roles	Tools & Techniques	
1 2.2	N0 1 2 3	SRS UC_NC STC	Name DE	Description Software Requirements Spe Use Case Excel Sheet - NOI Software Test Case Docume	c DE INT

Figure 174 Process Execution Record of Process Execution #11

SPC	- AAT	nent Proce	ss Improvemen	t Help					- • •
			<u></u>		>				
P	PROCESS DAT	4	M	ASSESS	MENT		1	PROCESS IMPROVEMENT	r
Proc Proc	ess Execution	s O Metri tecords	c Data Process Execut Record Info	tion Record	d Detail Outputs	Activities	Roles	Tools & Techniques	
1	25 C.A V	-		No		Nam	e	Description	
3	25 C.A 🖌	- X	1		UC_	NODE	-	Use Case Excel Sheet-	NODE
4 5 8 9 10 11 12 13 14 15	25 CA ¥ 25 CA ¥ 25 CA ¥ 25 CA ¥ 25 CA ¥ 25 CA ¥ 25 CA ¥ 25 CA ¥ 25 CA ¥ 25 CA ¥ 25 CA ¥ 25 CA ¥		2		STC			Software Test Case Doc	ument =
16 17 18	25 C.A ¥ 25 C.A ¥ 25 C.A ¥							Save Exec	ution Record

Figure 175 Process Execution Record of Process Execution #11

SPC - AAT Workspace Assessment Proc	ess Improvement Help			×
PROCESS DATA	M ASSESSMENT		PROCESS IMPROVEMENT	
Process Execution Records ProRecRecSel ↓ 1 25CA𝒴 ↓ 2 25CA𝒴 ↓ 3 25CA𝒴 ↓ 4 26CA𝒴 ↓ 5 25CA𝒴 ↓ 6 25CA𝒴 ↓ 9 25CA𝒴 ↓ 9 25CA𝒴 ↓ 10 25CA𝒴 ↓ 12 25CA 𝒴 ↓ 13 25CA 𝒴 ↓ 14 25CA 𝒴 ↓	Process Execution Record Deta Record Info Inputs Out No 1 2	il Name Save Test Result Run Test Case	es Tools & Techniques	
16 25 CA V 17 25 CA V 18 25 CA V			Save Execution Record	

Figure 176 Process Execution Record of Process Execution #11

SPC - AAT	ass Improvement Help			×
		2		
PROCESS DATA	M ASSESS	MENT	PROC	ESS IMPROVEMENT
Process Executions Metr Process Execution Records	ic Data	d Detail		
ProRecSel	Record Info Inputs	Outputs Activities	Roles Tools	& Techniques
2 25 CA V 3 25 CA V 5 25 CA V 6 25 CA V 7 25 CA V 9 25 CA V 10 25 CA V 11 25 CA V	<u>1 8</u>	Name System Tester 1	Act_No	Description Performs System Tes

Figure 177 Process Execution Record of Process Execution #11

ے SPC - AAT					
PROCESS DATA	M ASSES	SMENT		PROCESS IMPROVEMENT	
Process Executions O Metric Process Execution Records	: Data Process Execution Reco	rd Detail			
ProRecSel	Record Info Inputs	Outputs Activities	Roles	Tools & Techniques	
1 22.5 CA ♥ 3 25 CA ♥ 4 25 CA ♥ 5 25 CA ♥ 8 25 CA ♥ 9 25 CA ♥ 10 25 CA ♥ 11 25 CA ♥ 12 25 CA ♥ 13 25 CA ♥ 15 25 CA ♥ 15 25 CA ♥ 16 25 CA ♥ 16 25 CA ♥ 18 25 CA ♥	No 1 2 3	Name Internet Explorer Microsoft Word Microsoft Excel	Act 1 1 1	No Description Web Browser Word Document Excel Sheet Save Execu	tion Record

Figure 178 Process Execution Record of Process Execution #11

Figure 179 Process Execution Record of Process Execution #12

SPC - AAT Workspace Assessment Proce	ss Improvement Help	2	
PROCESS DATA	M ASSESS	MENT	PROCESS IMPROVEMENT
Process Executions O Metric	: Data		
Process Execution Records	Process Execution Recor	d Detail	
Pro Rec Sel	Record Info Inputs	Outputs Activities R	oles Tools & Techniques
2 25 C.A 🔽	No	Name	Description 🛛 🕞 📥
3 25 C.A 🖌 👗	1	SRS	Software Requirements Spec
4 25 C.A 🗹	2	UC_NODE	Use Case Excel Sheet - NODE 🛛 🙀
5 25 C.A 🗹 💳	3	STC	Software Test Case Document
7 25 CA V 8 25 CA V 9 25 CA V 11 25 CA V 12 25 CA V 13 25 CA V 14 25 CA V 15 25 CA V 16 25 CA V 17 25 CA V 18 25 CA V			Save Execution Record

Figure 180 Process Execution Record of Process Execution #12

SPC - AAT Workspace Assessment Proce	ess Improvement Help		
PROCESS DATA	ASSESSMENT		PROCESS IMPROVEMENT
Process Executions Metric Process Execution Records ProRecRecSel. YesRecRecRecSel. YesRecRecRecRecRecRecRecR	: Data Process Execution Record Detai Record Info Inputs Outp	l uts Activities Rol	es Tools & Techniques
1 25 C.A 🖌 🗖	No	Name	Description
3 25 CA 𝒴 4 25 CA 𝒴 5 25 CA 𝒴 7 25 CA 𝒴 8 25 CA 𝒴 9 25 CA 𝒴 24	2	UC_NODE	Use Case Excel Sheet - NODE Software Test Case Document
10 25 CA V 11 25 CA V 12 25 CA V 13 25 CA V 14 25 CA V 15 25 CA V 16 25 CA V			
17 25 C.A 🗹 18 25 C.A			Save Execution Record

Figure 181 Process Execution Record of Process Execution #12

SPC - AAT Workspace Assessment Proce	ess Improvement Help	2		
PROCESS DATA	M ASSESS	MENT	PROCESS IMPROVEMENT	
Process Executions O Metri	c Data			
Process Execution Records	Process Execution Record	d Detail		
ProRecSel	Record Info Inputs	Outputs Activities R	oles Tools & Techniques	
2 25 C.A 🖌 🗔	No	Name	Description	r 🔶 📥
3 25 C.A 🖌	1	Save Test Result	Save Test Resut	
4 25 C.A 🗹	2	Run Test Case	Run Test Case	×
5 25 C.A M	3	Create Test Package		
7 25 C.A 🖌 💙 8 25 C.A				
9 25 C.A 🗹 🛃				
11 25 C.A 🗹				
12 25 C.A 🖌				
13 25 C.A M				
15 25 CA				
16 25 C.A 🖌	<u></u>			
17 25 C.A 🖌			Save Execut	ion Record

Figure 182 Process Execution Record of Process Execution #12
👙 SPC - AAT	
Workspace Assessment Pro	2ess improvement Help
PROCESS DATA	M ASSESSMENT
Process Executions O Met	ric Data
Process Execution Records	Process Execution Record Detail
ProRecSel	Record Info Inputs Outputs Activities Roles Tools & Techniques
2 25 C.A 🗹	No Name Act_No Description 🔂 📥
3 25 C.A 💌 본	1 System Tester 1 Performs System Tes
4 25 C.A ⊮	
6 25 C.A	
7 25 C.A 🗹 🔻	
8 25 C.A 🗹	
10 25 C.A	
11 25 C.A 💌	
12 25 C.A V	
13 25 C.A 🗹	
15 25 C.A 🗹	
16 25 C.A 🖌	
17 25 C.A 🗹 18 25 C.A 🗹	Save Execution Record

Figure 183 Process Execution Record of Process Execution #12

SPC - AAT Workspace Assessment Proc	ess Improvement Help					
PROCESS DATA	M ASSES	SMENT		PROCES	SS IMPROVEMENT	
Process Executions Metri Process Execution Records ProRecRecSel	c Data Process Execution Reco	rd Detail Outputs Activities	Role	s Tools &	<u>Fechniques</u>	
PTOPGEPGEDol 1 2.5CA. ℓ 3 2.5CA. ℓ 4 2.5CA. ℓ 5 2.5CA. ℓ 6 2.5CA. ℓ 7 2.5CA. ℓ 8 2.5CA. ℓ 9 2.5CA. ℓ 10 2.5CA. ℓ 12 2.5CA. ℓ 12 2.5CA. ℓ 12 2.5CA. ℓ 12 2.5CA. ℓ 12 2.5CA. ℓ 13 2.5CA. ℓ 14 2.5CA. ℓ 15 2.5CA. ℓ 16 2.5CA. ℓ	No 1 2 3 4	Name Internet Explorer Microsoft Word Microsoft Excel CA Harvest	1 1 1 1	Act_No	Description Web Browser Word Document Excel Sheet Configuration Mar	
16 25 C A ⊭ 17 25 C A ⊭ 18 25 C A ⊭					Save Execut	tion Record

Figure 184 Process Execution Record of Process Execution #12

SPC - AAT	ress Improvement Heln	_ _ ×
PROCESS DATA	M ASSESSMENT	r
Process Executions Metri Process Execution Records Process Execution Reco	ric Data Process Execution Record Detail Process Execution No: 13 Recorded On: 26 Haz 2007 Recorded By: CALTUN Process Execution Qu Save Execution Qu	estionnaire>>

Figure 185 Process Execution Record of Process Execution #12

SPC - AAT Workspace Assessment Proc	ess Improvement Help					
PROCESS DATA	M ASSES	SMENT		•	PROCESS IMPROVEN	IENT
Process Execution Records ProRecRecSel	Process Execution Rec	ord Detail Outputs	Activities	Roles	Tools & Techniques	
1 25 CA V 2 25 CA V 3 25 CA V 4 25 CA V 5 25 CA V 6 25 CA V 9 25 CA V 9 25 CA V 10 25 CA V 11 25 CA V 12 25 CA V 13 25 CA V 14 25 CA V 15 25 CA V 16 25 CA V 15 25 CA V 16 25 CA V 17 25 CA V 18 25 CA V	No 1 2 3	SRS UC_ STC	NoDE	8	Description Software Requirem Use Case Excel She Software Test Case	n mts Spec Let - NODE Document

Figure 186 Process Execution Record of Process Execution #13

SPC - AAT	ana luura amant Ualu	
PROCESS DATA	M ASSESSMENT	PROCESS IMPROVEMENT
Process Executions Metr Process Execution Records ProRecSel	ic Data Process Execution Record Detail Record Info Inputs Outputs Activities R	oles Tools & Techniques
1 25CA. v 3 25CA. v 5 25CA. v 6 25CA. v 8 25CA. v 9 25CA. v 10 25CA. v 11 25CA. v 12 25CA. v 12 25CA. v 12 25CA. v 12 25CA. v 13 25CA. v	No Name 1 UC_NODE 2 STC	Use Case Excel Sheet- NODE Software Test Case Document
14 25 CA Ø 15 25 CA Ø 16 25 CA Ø 17 25 CA Ø 18 25 CA Ø		Save Execution Record

Figure 187 Process Execution Record of Process Execution #13

PROCESS DATA M ASSESSMENT PROCESS IMPROVEMENT ● Process Executions ● Metric Data ● Process Execution Records Process Execution Records Process Execution Record Detail Process Execution Records Process Execution Record Detail Process Execution Records Process Execution Record Detail Process Execution Records Process Execution Record Detail Process Execution Records Process Execution Record Detail Process Execution Records Process Execution Record Detail Process Execution Records Process Execution Record Detail Process Execution Record Info Inputs Name Save Test Result Save Test Result Process Process Process Process Process Process Process Process Process <th>SPC - AAT Workspace Assessment Proce</th> <th>ess Improvement Help</th> <th></th> <th></th> <th></th>	SPC - AAT Workspace Assessment Proce	ess Improvement Help			
Process Executions Metric Data Process Execution Records Process Execution Record Detail Process Execution Record Detail Process Execution Record Detail Process Execution Record Info Inputs Outputs Activities Roles Tools & Techniques Roles Tools & Techniques No Name Description Save Test Result Test Case Run Test Case T	PROCESS DATA	M ASSESSMENT		PROCESS IMPROVEMENT	
1 25CA. ♥ 2 25CA. ♥ 3 25CA. ♥ 5 25CA. ♥ 6 25CA. ♥ 8 25CA. ♥ 9 25CA. ♥ 10 25CA. ♥ 11 25CA. ♥ 12 25CA. ♥ 11 25CA. ♥ 12 25CA. ♥ 11 25CA. ♥ 12 25CA. ♥ 13 25CA. ♥ 14 25CA. ♥ 15 25CA. ♥ 16 25CA. ♥ 17 25CA. ♥ 18 25CA. ♥	Process Executions Metric Process Execution Records ProRecRecSel	c Data Process Execution Record Det Record Info Inputs Out	ail puts Activities Rol	es Tools & Techniques	
10 25 C A EXE	1 25 CA 𝒴 2 25 CA 𝒴 3 25 CA 𝒴 4 25 CA 𝒴 5 25 CA 𝒴 8 25 CA 𝒴 9 25 CA 𝒴 10 25 CA 𝒴 11 25 CA 𝒴 12 25 CA 𝒴 12 25 CA 𝒴 13 25 CA 𝒴 14 25 CA 𝒴 15 25 CA 𝒴 14 25 CA 𝒴 15 25 CA 𝒴 14 25 CA 𝒴 17 25 CA 𝒴	No 1 2	Name Save Test Result Run Test Case	Save Executi	

Figure 188 Process Execution Record of Process Execution #13

ے SPC - AAT Workspace Assessment Proc	cess Improvement Help			
		2		
PROCESS DATA	M ASSESSI	MENT	PROCES	SS IMPROVEMENT
Process Executions Meter Process Execution Records	ic Data	I Detail		
ProRecSel	Record Info Inputs	Outputs Activities	Roles Tools &	lechniques
2 25 CA ¢ 3 25 CA ¢ 4 25 CA ¢ 5 25 CA ¢ 7 25 CA ¢ 8 25 CA ¢ 9 25 CA ¢ 9 25 CA ¢ 10 25 CA ¢ 11 25 CA ¢ 12 25 CA ¢ 13 25 CA ¢ 14 25 CA ¢ 14 25 CA ¢	No 1 S	Name	Act_No	Description Performs System Tes

Figure 189 Process Execution Record of Process Execution #13

SPC - AAT Workspace Assessment Proce	ess Improvement Help				
	🏂 婱 🤇	2			
PROCESS DATA	M ASSESS	SMENT	PROCE	SS IMPROVEMENT	
Process Executions O Metri	c Data				
Process Execution Records	Process Execution Reco	rd Detail			
ProRecSel	Record Info Inputs	Outputs Activities	Roles Tools &	Techniques	
2 25 C.A 🗹 🏹	No	Name	Act_No	Description	
3 25 C.A 🗹	1	Internet Explorer 1		Web Browser	
5 25 C.A 🖌 🔺	2	Microsoft Word 1		Word Document	×
6 25 C.A 🗾	3	Microsoπ Excel		Excel Sheet	
7 25 C.A 🗹 💙					
9 25 C.A 🗹 🛃					
10 25 C.A 🗹 🧮					
11 25 C.A 🗹					
13 25 C.A 🖌					
14 25 C.A 🗹					
16 25 CA					-
17 25 C.A 🖌				- Court France	
18 25 C.A 💌				Save Execution	on Record

Figure 190 Process Execution Record of Process Execution #13

SPC - AAT		
PROCESS DATA	ASSESSMENT	PROCESS IMPROVEMENT
	Record Info	Tools & Techniques Tools & Techniques

Figure 191 Process Execution Record of Process Execution #14

SPC - AAT Workspace Assessment Proce	ss Improvement Help					
PROCESS DATA	M ASSE	SSMENT		i	PROCESS IMPROVEN	IENT
Process Executions O Metric	Data					
Process Execution Records	Process Execution Rec	ord Detail		1/		
ProRecSel	Record Info Inputs	Outputs	Activities	Roles	Tools & Techniques	
2 25 C.A 🗹 💽	No		Nam	е	Descriptio	on 📑 🚽
3 25 C.A 💌 🚨	1	SRS	3		Software Requireme	ents Spec
4 25 C.A 🖌	2	UC.	NODE		Use Case Excel She	eet - NODE
6 25 C.A	3	STO	>		Software Test Case	Document =
7 25 C.A 🗹 💙						
9 25 C.A 🖌						
10 25 C.A 🖌						
11 25 C.A 🗹						
13 25 C.A						
14 25 C.A 💌						
15 25 C.A 🗹						•
17 25 C.A 🖌						
18 25 C.A 🗹					Save E	execution Record

Figure 192 Process Execution Record of Process Execution #14

SPC - AAT Workspace Assessment Pro	cess Improvement Help		
PROCESS DATA	M ASSESSMENT		PROCESS IMPROVEMENT
Process Executions Met Process Execution Records ProRecRecSel	ric Data Process Execution Record Deta Record Info Inputs Out;	il nuts Activities Roles	Tools & Techniques
1 25 CA. 𝒴 2 25 CA. 𝒴 3 25 CA. 𝒴 4 25 CA. 𝒴 5 25 CA. 𝒴 6 25 CA. 𝒴 9 25 CA. 𝒴 10 25 CA. 𝒴 11 25 CA. 𝒴 12 25 CA. 𝒴 13 25 CA. 𝒴 14 25 CA. 𝒴	No 1 2	Name UC_NODE STC	Description Use Case Excel Sheet - NODE Software Test Case Document
15 25 CA V 16 25 CA V 17 25 CA V 18 25 CA V			Save Execution Record

Figure 193 Process Execution Record of Process Execution #14

🦻 SPC - AAT	luurent liele			
PROCESS DATA	M ASSESSME	٩T	PROCESS IMPROVEMENT	
Process Executions Me Process Execution Records	ric Data	etail		
Pro Rec Sel 1 25 C.A	Record Info Inputs C	utputs Activities Ro	oles Tools & Techniques	
2 25 C.A 🖌 📑	No	Name	Description	
3 25 C.A 🖌	1	Save Test Result	Save Test Resut	
5 25 C.A 🖌 🔺	2	Run Test Case	Run Test Case	💌
6 25 C.A ♥ 7 25 C.A ♥ 8 25 C.A ♥	5	Cleale restrackage		
9 25 C.A 🗹 10 25 C.A 🗹				
12 25 C.A 🖌				
13 25 C.A 🖌				
14 25 C.A				
16 25 C.A 🔽				-
17 25 C.A 🖌			Save Execut	tion Record
18 25 U.A			Suve Enecu	

Figure 194 Process Execution Record of Process Execution #14

SPC - AAT	ace Improvement Help	
PROCESS DATA	M ASSESSMENT	PROCESS IMPROVEMENT
Process Executions Meta Process Execution Records ProRecRecSel	ic Data Process Execution Record Detail Record Info Inputs Outputs Activities Re	Iles Tools & Techniques
1 25CA. v 3 25CA. v 4 25CA. v 5 25CA. v 8 25CA. v 9 25CA. v 9 25CA. v 10 25CA. v 11 25CA. v 13 25CA. v 13 25CA. v 14 25CA. v 15 25CA. v 16 25CA. v 17 25CA. v 18 25CA. v 18 25CA. v 18 25CA. v 18 25CA. v 18 25CA. v 18 25CA. v 18 25CA. v 18 25CA. v 18 25CA. v 19 25CA. v 19 25CA. v 10 25CA. v 10 25CA. v 10 25CA. v 11 25CA. v 11 25CA. v 12 25CA. v 13 25CA. v 14 25CA. v 15 25CA. v 15 25CA. v 16 25CA. v 17 25CA. v 18 25CA. v	No Name 1 System Tester 1	Act_No Description Performs System Tes.

Figure 195 Process Execution Record of Process Execution #14

👙 SPC - AAT						
Workspace Assessment Proce	ss impi overnent Heip					
	2 📚 🔰					
PROCESS DATA	M ASSES	SMENT		PROCES	S IMPROVEMENT	
Process Executions Metric						
Process Execution Records	Record Info Inputs	rd Detail Outputs Activities	s Roles	Tools & T	echniques	
1 25 C.A 🗹 2 25 C.A 🗹 3 25 C.A 🗹	No 1	Name Internet Explorer	A	ct_No	Description Web Browser	
4 25 C.A 🖌	2 3	Microsoft Word Microsoft Excel	1		Word Document Excel Sheet	
8 25 C.A ♥ 8 25 C.A ♥	4	CA Harvest	3		Configuration Mana	g
9 25 C.A ☑ 10 25 C.A ☑						
11 25 CA 🗹 12 25 CA 🗹						
14 25 CA V 15 25 CA V						Ţ
16 25 C.A ♥ 17 25 C.A ♥ 18 25 C.A ♥					Save Executio	in Record
					••••	

Figure 196 Process Execution Record of Process Execution #14

SPC - AAT	cess improvement Help	- • ×
PROCESS DATA	M ASSESSMENT	
Process Executions Met	ric Data	
Process Execution Records	Process Execution Record Detail Record Info Inputs Outputs Activities Roles Tools & Techniques Process Execution No: [5 [5 Recorded On: [25 Haz 2007 Recorded By: C ALTUN Process Execution Question [5] [6] [6] Save Execution Save Execution [6] [6] [6] [6]	n Record

Figure 197 Process Execution Record of Process Execution #15

SPC - AAT	ess Improvement Help		
	3		
PROCESS DATA	M ASSESSMENT		PROCESS IMPROVEMENT
Process Executions Metri Process Execution Records Pro Doc Rec Set	c Data Process Execution Record Det	ail	Table & Taskainus
PTORCGRCGSel 1 2.5CA 3 25CA 4 25CA 5 25CA 6 25CA	Record Info Inputs Out	puts Activities Roles Name SRS UC_NODE STC	Tools & Techniques Description Software Requirements Spec Use Case Excel Sheet - NODE Software Test Case Document
7 25 CA V 8 26 CA V 9 25 CA V 11 25 CA V 12 25 CA V 13 25 CA V 14 26 CA V 15 25 CA V 16 25 CA V 17 26 CA V 18 26 CA V			Save Execution Record

Figure 198 Process Execution Record of Process Execution #15

g SPC - AAT Workspace Assessment Pr	cess Improvement Help		- • • ×
PROCESS DATA	ASSESSMENT		PROCESS IMPROVEMENT
Process Executions M Process Execution Records ProRecSel	tric Data Process Execution Record Deta Record Info Inputs Out;	il Juts Activities Roles	Tools & Techniques
1 25 C.A	No	Name	Description
3 25 C.A 🖌 💌	1	UC NODE	Use Case Excel Sheet - NODE
4 25. CA. r 5 25. CA. r 6 25. CA. r 7 25. CA. r 8 25. CA. r 10 25. CA. r 11 25. CA. r 12 25. CA. r 13 25. CA. r 14 25. CA. r	2	STC	Software Test Case Document
15 25 C A V 16 25 C A V 17 25 C A V 18 25 C A V			Save Execution Record

Figure 199 Process Execution Record of Process Execution #15

SPC - AAT Workspace Assessment Proce	ess Improvement Help			
PROCESS DATA	M ASSESSMEN	т	PROCESS IMPROVEMENT	
Process Executions O Metric	c Data			
Process Execution Records	Process Execution Record De	tail		
Pro Rec Sel 1 25 C.A 🖌	Record Info Inputs O	itputs Activities Ro	les Tools & Techniques	
2 25 C.A 🖌 💌	No	Name Save Test Result	Description Save Test Resut	
4 25 C.A 🖌	2	Run Test Case	Run Test Case	
5 25 C.A 🖌 📥	3	Create Test Package		
7 25 CA ∠ 8 25 CA ∠				
9 25 C.A ⊻ 10 25 C.A ⊻ 11 25 C.A. ⊻				
12 25 C.A 🗹				
13 25 C.A 🖌				
15 25 C.A 🖌				-
16 25 C.A V	p.1.			
18 25 C.A 🗹			Save Executio	n Record

Figure 200 Process Execution Record of Process Execution #15

g SPC - AAT Vorkspace Assessment	Process Improvement Help				- • •
PROCESS DATA	M ASSE	SSMENT		PROCESS IMPROVEMENT	r
Process Executions	Metric Data				
Process Execution Record	Process Execution Rec	cord Detail	Roles	Tools & Techniques	
1 25 CA V 2 25 CA V 3 26 CA V 4 25 CA V 5 25 CA V 7 25 CA V 8 25 CA V 9 25 CA V 10 25 CA V 11 25 CA V	No 1	Name System Tester 7	Act	No Description Performs System	n Tes 😭 👗

Figure 201 Process Execution Record of Process Execution #15

e SPC - AAT Norkspace Assessment Pro	cess Improvement Help	$\mathbf{\Sigma}$				
PROCESS DATA	M ASSES	SMENT		PROCE:	SS IMPROVEMENT	
Process Executions Met Process Execution Records ProRecRecSel	ric Data Process Execution Reco	ord Detail	es Role	s Tools &	Techniques	
1 25 CA V 2 25 CA V 3 25 CA V 5 25 CA V 6 25 CA V 9 25 CA V 9 25 CA V 10 25 CA V 11 25 CA V 13 25 CA V 13 25 CA V 14 25 CA V 15 25 CA V 16 25 CA V	No 1 2 3 4	Name Internet Explorer Microsoft Word Microsoft Excel CA Harvest	1 1 1 3 3	Act_No	Description Web Browser Word Document Excel Sheet Configuration Mana	g
17 25 C.A 🗹 18 25 C.A 🗹					Save Executio	on Record

Figure 202 Process Execution Record of Process Execution #15

👙 SPC - AAT								
workspace Assessment Proc	ess improvement Help							
	🔌 놀 💡							
PROCESS DATA	M ASSESSMENT	PROCESS IMPROVEMENT						
Process Executions Metr	Process Executions O Metric Data							
Process Execution Records ProRecRecSel 1 25CA	Process Execution Record Detail Record Info Inputs Outputs Activities Role	es Tools & Techniques						
2 25 C.A 🖌 3 25 C.A 🖌 4 25 C.A								
5 25 C.A 🖌 📥	Process Execution No: 16							
8 25 C.A 🗹	Recorded On: 25.Haz.2007							
9 25 C.A 🗹 10 25 C.A 🗹	Recorded By: C.ALTUN	Process Execution Questionnaire>>						
12 25 C.A V 13 25 C.A V								
14 25 C.A 🖌 15 25 C.A 🖌								
16 25 C.A ⊭ 17 25 C.A ⊭ 18 25 C.A ⊭		Save Execution Record						

Figure 203 Process Execution Record of Process Execution #16

SPC - AAT Workspace Assessment Pr	ocess Improvement Help)	
PROCESS DATA	M ASSESS	dent	PROCESS IMPROVEMENT
Process Executions M Process Execution Records Pro. Rec. Rec. Set	Process Execution Record	I Detail	Noe Toole 8. Tachnique
1 25 C.A 🗹	Record mo mputs	Outputs Activities Ru	nes Tools & rechniques
2 25 C.A 🖌 🔀	N0	SRS	Software Requirements Spec
4 25 C.A 🖌 🔼	2	UC_NODE	Use Case Excel Sheet - NODE
5 25 C.A 🗹 📥	3	STC	Software Test Case Document
7 25CA. 𝒴 8 25CA. 𝒴 9 25CA. 𝒴 10 25CA. 𝒴 11 25CA. 𝒴 12 25CA. 𝒴 13 25CA. 𝒴 14 25CA. 𝒴 15 25CA. 𝒴 16 25CA. 𝒴 17 25CA. 𝒴 18 25CA. 𝒴			Save Execution Record

Figure 204 Process Execution Record of Process Execution #16

Inspace Assessment Process improvement rep P PROCESS DATA P PROCESS DATA M ASSESSMENT Process Execution Record Detail Process Execution Record Detail Process Execution Record Info 1 25 2 25 2 25 2 25 2 25 2 25 2 25 2 25 2 25 2 2 3 2 2 5 2 2 5 2 2 5 2 2 5 2 2 5 2 2 5 2 2 5 2 2 5 2 2 5 2 5 <th></th>	
P PROCESS DATA ▲ ASSESSMENT PROCESS IMPROVEMENT Process Executions Metric Data Yoccss Execution Records Process Execution Record Detail Process Execution Record Detail Process Execution Record Detail Process Execution Record Detail Record Info 1 25 CA 25 CA ✓ 3 25 CA 25 CA ✓ 3 25 CA 3 25 CA	
Process Executions Metric Data rocess Execution Record Detail rocess Execution Record Detail Record Info Inputs Outputs Activities Roles Tools & Techniques 25CA. Record Info Inputs Outputs Activities Roles Tools & Techniques 1 25CA. Record Info Inputs Outputs Activities Roles Tools & Techniques 1 25CA. Record Info Inputs Outputs Activities Roles Tools & Techniques 1 25CA. Record Info Inputs Outputs Activities Roles Tools & Techniques 1 25CA. Record Info Inputs Outputs Activities Roles Tools & Techniques 1 25CA. Record Info Inputs Outputs Activities Roles Tools & Techniques 2 2 3CA. Record Info Inputs Outputs Activities Roles Tools & Techniques 2 3CA. Record Info Inputs Outputs Activities Roles Tools & Techniques 2 4CA. Record Info Inputs Outputs Activities Roles Tools & Techniques 2 5CA. Record Info Inputs Outputs Activities Roles Tools & Techniques 2 5CA. Record Info Inputs Outputs Activities Roles Tools & Techniques 2 5CA. Record Info Inputs Outputs Activities Roles Tools & Techniques 2 5CA. Record Info Inputs Outputs Activities Roles Tools & Techniques 2 5CA. Record Info Inputs Outputs Activities Roles Tools & Techniques 2 5CA. Record Info Inputs Outputs Activities Roles Tools & Techniques 2 5CA. Record Info Inputs Outputs Activities Roles Tools & Techniques 2 5CA. Record Info Inputs Outputs Activities Roles Tools & Techniques 2 5CA. Record Info Inputs Outputs Activities Roles Tools & Techniques 2 5CA. Record Info Input SecCA. Record Info Input SecCA. Record Info Input SecCA. Record Info Input SecCA. Record Info Input SecCA. Record Info Input SecCA. Record Info Input SecCA. Record Info Input SecCA. Record Info Input SecCA. Record Info Input SecCA. Record Info Input SecCA. Record Info Input SecCA. Record Info Input SecCA. Record Info Input SecCA. Record Info Input SecCA. Record Info Input SecCA. Record Info Input SecCA. Record Info Input SecCA	
No Name Description 2 25 CA ✓ 3 25 CA ✓ 4 25 CA ✓ 5 25 CA ✓ 3 25 CA ✓ 3 25 CA ✓ 3 25 CA ✓ 3 25 CA ✓	
2 25 CA. V 4 25 CA. V 5 25 CA. V 2 STC Software Test Case Docum 3 25 CA. V 2 STC Software Test Case Docum	
4 22CA 12 5 25CA 12 3 25CA 12	DDE
5 25 CA K	nent 🙀
7 25 C.A 🗹 🔽	
9 25 C.A 🖌 🛃	
10 25 C.A 🖌	
11 25 C.A 🗹	
13 25 CA 🖌	
14 25 C.A 🗹	
15 25 C.A M	
17 25 C.A 🗸	-
18 25 C.A V Save Executi	

Figure 205 Process Execution Record of Process Execution #16

🖢 SPC - AAT	as hunra musut Hala			
PROCESS DATA	M ASSESSMI	INT	PROCESS IMPROVEMENT	
Process Executions Metric Process Execution Records ProRecRecSel	Data Process Execution Record I Record Info	Detail	nies / Tools & Techniques	
1 25 C.A 🖌	No.	Name	Description	
3 25 C.A 🖌 🗶	1	Save Test Result	Save Test Resut	
4 25 C.A 🖌	2	Run Test Case	Run Test Case	
5 25 C.A 🗹 📥	3	Create Test Package		
3 25 0 A ∠ 7 25 C.A ∠ 8 25 C.A ∠ 9 25 C.A ∠				
10 25 C.A V 11 25 C.A V 12 25 C.A V 13 25 C.A V				
14 25 C.A ⊭ 15 25 C.A ⊭				-
16 25 C.A ✔ 17 25 C.A ✔ 18 25 C.A ✔			Save Executi	on Record

Figure 206 Process Execution Record of Process Execution #16

y SPC - AAT	
PROCESS DATA	M ASSESSMENT
Process Executions Me Process Execution Records ProRecRecSel	tric Data Process Execution Record Detail Record Info
1 25 C.A 𝒴 2 25 C.A 𝒴 4 26 C.A 𝒴 5 25 C.A 𝒴 6 25 C.A 𝒴 7 25 C.A 𝒴 8 25 C.A 𝒴 9 25 C.A 𝒴 11 25 C.A 𝒴 12 25 C.A 𝒴 13 25 C.A 𝒴 14 25 C.A 𝒴 13 25 C.A 𝒴 14 25 C.A 𝒴 15 25 C.A 𝒴	No Name Act_No Description 1 System Tester 1 Performs System Test

Figure 207 Process Execution Record of Process Execution #16

SPC - AAT Workspace Assessment Proce	ess Improvement Help					
PROCESS DATA	M ASSES	SMENT		PROCES:	S IMPROVEMENT	
Process Executions O Metri	c Data					
Process Execution Records	Record Info Inputs	Outputs Activities	s Roles	Tools & T	echniques	
1 25 CA V 2 25 CA V 3 25 CA V 4 25 CA V 5 25 CA V	No 1 2	Name Internet Explorer Microsoft Word	Act 1 1	L_No	Description Web Browser Word Document	
6 25 C.A 🗹 7 25 C.A 🗹 8 25 C.A 🗹	4	CA Harvest	3		Configuration Manag	
9 22 CA ♥ 10 25 CA ♥ 11 25 CA ♥ 12 25 CA ♥ 13 25 CA ♥ 14 25 CA ♥ 15 25 CA ♥ 16 25 CA ♥ 17 25 CA ♥ 18 25 CA ♥					Save Execution	v Record

Figure 208 Process Execution Record of Process Execution #16

👙 SPC - AAT	
Workspace Assessment Pro	cess Improvement Help
PROCESS DATA	M ASSESSMENT
Process Executions O Met	ric Data
Process Execution Records Pro. Rec. Rec. Sel. 1 25 CA. 𝒴 3 25 CA. 𝒴 4 25 CA. 𝒴 6 25 CA. 𝒴 7 25 CA. 𝒴 9 25 CA. 𝒴 10 25 CA. 𝒴 11 25 CA. 𝒴	Process Execution Record Detail Record Info Inputs Outputs Activities Roles Tools & Techniques Process Execution No: 17 Recorded On: 25 Haz 2007 Cold Recorded By: C ALTUN
13 25 CA. V 14 25 CA. V 15 25 CA. V 16 25 CA. V 17 25 CA. V 18 25 CA. V	Save Execution Record

Figure 209 Process Execution Record of Process Execution #17

SPC - AAT	Dragage k		Hole					
				?				
PROCESS DATA		M	ASSESS	MENT		1	PROCESS IMPROVEM	ENT
Process Executions Process Execution Reco) Metric Dat	a cess Execut	ion Recor	d Detail	Activities	Roles	Tools & Techniques	
1 25 C.A 🖌		ccoramio	Mo	outputs	Nor	10103	Description	
3 25 C.A V	<u>×</u>]		NU	SR	3	le	Software Requireme	nts Spec
4 25 C.A 🗹	2	2		UC	UC_NODE		Use Case Excel She	et - NODE
5 25 C.A 🖌	3			STO	2		Software Test Case I	Document 🛄 😑
7 25 CA V 8 25 CA V 9 25 CA V 10 25 CA V 11 25 CA V 13 25 CA V 14 25 CA V 15 25 CA V								

Figure 210 Process Execution Record of Process Execution #17

SPC - AAT Workspace Assessment Proce	ess Improvement Help			
	🈼 婱 🤇	2		
PROCESS DATA	M ASSESS	MENT	PROCESS IMPRO	VEMENT
Process Executions O Metric Process Execution Records ProRecRecSel	Data Process Execution Record	I Detail	Roles Tools & Technique	25
1 25 C.A 🗹	No	Nam	e Descr	iption
3 25 C.A 🗹 👗	1	UC_NODE	Use Case Excel	Sheet - NODE
4 25 CA V 5 25 CA V 7 25 CA V 8 25 CA V 10 25 CA V 11 25 CA V 11 25 CA V 13 25 CA V 13 25 CA V 15 25 CA V 15 25 CA V	2	STC	Software Test C	ase Document
17 25 C.A V 18 25 C.A V			Sa	ve Execution Record

Figure 211 Process Execution Record of Process Execution #17

SPC - AAT	ss Improvement Help			
	<u>i</u>			
PROCESS DATA	M ASSESSMENT		PROCESS IMPROVEMENT	
Process Executions Metric Process Execution Records ProRecRecSel	Data Process Execution Record Deta Record Info Contents	il nuts Activities Roles	Tools & Techniques	
1 25 C.A 🗹	No.	Namo	Description	
3 25 C.A 🖌 📩	1	Save Test Result	Save Test Resut	
4 25 C.A 🖌	2	Run Test Case	Run Test Case	
5 25 C.A 🗹 📥	3	Create Test Package		
7 25 C.A 🖌 🔻				
8 25 C.A 🗹				
9 25 C.A 🗹 😫				
11 25 C.A 🖌				
12 25 C.A 🗹				
13 25 C.A 🗹				
14 25 C.A 🖌				
16 25 C.A 🖌				
17 25 C.A 🖌 18 25 C.A 🖌			Save Executi	on Record

Figure 212 Process Execution Record of Process Execution #17

SPC - AAT Workspace Assessment Proc	ess Improvement Help			- • ×
	<u>Þ</u>	2		
PROCESS DATA	M ASSESS	MENT	PROCE	SS IMPROVEMENT
Process Executions Metri	ic Data			
Process Execution Records	Process Execution Recor	rd Detail		
ProRecSel	Record Info Inputs	Outputs Activities	Roles Tools &	Techniques
2 26. CA 𝒴 3 25 CA 𝒴 4 26 CA 𝒴 5 25 CA 𝒴 6 25 CA 𝒴 7 25 CA 𝒴 8 25 CA 𝒴 9 25 CA 𝒴 10 25 CA 𝒴 11 25 CA 𝒴 12 25 CA 𝒴 13 25 CA 𝒴 14 25 CA 𝒴 15 25 CA 𝒴 16 25 CA 𝒴 16 25 CA 𝒴	No 1	Name System Tester 1	Act_No	Description Performs System Tes

Figure 213 Process Execution Record of Process Execution #17

SPC - AAT Workspace Assessment Proc	ess Improvement Help				
	🈼 逢 🤇	2			
PROCESS DATA	M ASSES	SMENT	Ð	PROCESS IMPROVEMENT	
Process Executions O Metri	c Data				
Process Execution Records	Process Execution Reco Record Info Inputs	rd Detail Outputs Activities	s Roles	Tools & Techniques	
Pro. Rec. Rec Sel ↓ 1 25 CA ↓ 3 25 CA ↓ 4 25 CA ↓ 5 25 CA ↓ 6 25 CA ↓ 7 25 CA ↓ 8 25 CA ↓ 9 25 CA ↓ 10 25 CA ↓ 11 25 CA ↓ 12 25 CA ↓ 13 25 CA ↓ 14 25 CA ↓ 15 25 CA ↓ 16 25 CA ↓ 17 255 CA ↓ 17 255 CA ↓	No 1 2 3 4	Name Internet Explorer Microsoft Word Microsoft Excel CA Harvest	Act_N 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	lo Description Web Browser Word Document Excel Sheet Configuration Man	
17 25 C.A ⊭ 18 25 C.A ⊭				Save Execut	ion Record

Figure 214 Process Execution Record of Process Execution #17

SPC - AAT	ass Improvement Halp	- • •
PROCESS DATA	M ASSESSMENT	PROCESS IMPROVEMENT
● Process Execution ● Metr Process Execution Records	Process Execution Record Detail	les Tools & Techniques

Figure 215 Process Execution Record of Process Execution #17

SPC - AAT Workspace Assessment Proce	ss Improvement	Help					- 0 🔀
	<u>></u>						
PROCESS DATA	M	SSESSN	IENT			PROCESS IMPROVEMENT	
Process Executions O Metric	: Data						
Process Execution Records	Process Execution	n Record	Detail				
ProRecSel	Record Info	Inputs	Outputs	Activities	Roles	Tools & Techniques	
2 25 C.A 🖌	No)		Nam	e	Description	
3 25 C.A 🖌 👗	1		UC_I	NODE		Use Case Excel Sheet - NODE	
4 25 C.A 🗹	2		STC			Software Test Case Documen	t 🗙
6 25 C.A 🖌							
7 25 C.A 🗹 🔻							
8 25 C.A 🗹							
10 25 CA 🔽							
11 25 C.A 🖌							
12 25 C.A 🗹							
14 25 C.A 🖌							
15 25 C.A 🖌							-
16 25 C.A 🗹	<u></u>						
18 25 C.A V						Save Execution	Record
						L	

Figure 216 Process Execution Record of Process Execution #18

Process Executions Metric Data Process Executions Metric Data Process Execution Records Process Execution Records Process Execution Records Process Execution Records Process Execution Records Process Execution Records Process Execution Records Process Execution Records Process Execution Records Process Execution Records Process Execution Records Process Execution Records Process Execution Records Process Execution Records Process Execution Records Process Execution Records Process Execution Records Process Execution Records Process Execution Records Process Execution Records Process Execution Records Process Execution Records Process Execution Records Process Execution Records Process Execution Records Process Execution Records Process Execution Records Process Execution Records Process Execution Records Process Execution Records Process Execution Records Process Execution Records Process Execution Records Process Execution Records Process Execution Records Process Execution Records </th <th>SS Execution</th> <th>ASSESSI on Record Inputs</th> <th>d Detail Outputs</th> <th>Activities</th> <th>Roles</th> <th>PROCESS IN Tools & Tech</th> <th>MPROVEMENT</th> <th></th>	SS Execution	ASSESSI on Record Inputs	d Detail Outputs	Activities	Roles	PROCESS IN Tools & Tech	MPROVEMENT	
Process Executions Metric Data Process Execution Records Process Execution Records P25CA Process Execution Records 125CA Process Execution Records 25CA Process Execution Records 125CA Process Execution Records 125CA Process Execution Records 125CA Process Execution Records 125CA Process Execution Records 125CA Process Execution Records 125CA Process Execution Records 125CA Process Execution Records 125CA Process Execution Records 125CA Process Execution Records 125CA Process Execution Records 125CA Process Execution Records 125CA Process Execution Records 125CA Process Execution Records 125CA Process Execution Records 125CA Process Execution Records 125CA Process Execution Records	SS Executio	ASSESSI on Record Inputs	d Detail Outputs	Activities	Roles	PROCESS IN	MPROVEMENT	
Process Executions Metric Data Process Execution Records Process Execution Records T 25 CA. P 2 25 CA. P 3 25 CA. P 3 25 CA. P 3 25 CA. P 3 25 CA. P 3 25 CA. P 3 25 CA. P 3 25 CA. P 3 25 CA. P 3 25 CA. P 3 25 CA. P	ss Executio cord Info	on Record Inputs	d Detail Outputs	Activities	Roles	Tools & Tech	miques	
1 25 CA ✓ 2 25 CA ✓ 3 25 CA ✓ 4 25 CA ✓ 5 25 CA ✓ 8 25 CA ✓ 8 25 CA ✓ 9 25 CA ✓ 9 25 CA ✓ 10 25 CA ✓	N	10	Capito	Nam			Inqueo	
2 25 CA ♥ ▲ 3 25 CA ♥ ▲ 4 25 CA ♥ 5 25 CA ♥ 6 25 CA ♥ 9 25 CA ♥ 9 25 CA ♥ 10 25 CA ₽	IN	10	Cov	INditio			Description	
4 25 CA 𝒴 5 25 CA 𝒴 6 25 CA 𝒴 7 25 CA 𝒴 8 25 CA 𝒴 9 25 CA 𝒴 10 25 CA 𝒴			00/9	e Test Result	0	Save Test	Resut	
5 25 C.A $\not e'$ 6 25 C.A $\not e'$ 7 25 C.A $\not e'$ 8 25 C.A $\not e'$ 9 25 C.A $\not e'$ 10 25 C.A $\not e'$ 21	2		Run	Run Test Case Run Test Case		Case		
6 25 CA ℓ 7 25 CA ℓ 9 25 CA ℓ 10 25 CA ℓ			Cre	ate Test Packa	age			
8 25 CA 🗹 9 25 CA 🗹 10 25 CA 🗹					-			
9 25 C.A 🗹 🛃								
10 25 U.A 🖌 💆 👘								
11 25 CA								
12 25 C.A 🖌								
13 25 C.A 🗹								
14 25 C.A 🗹								
16 25 C.A 🖌								-
17 25 C.A 🖌							0.5	tion Depart
18 25 C.A								anna 200-000

Figure 217 Process Execution Record of Process Execution #18

SPC - AAT Workspace Assessment Proce	ess Improvement Help)		
PROCESS DATA	M ASSESSME	ENT	PROCES	S IMPROVEMENT
Process Execution Records	Process Execution Record I Record Info Inputs	Detail Outputs Activities	Roles Tools & T	echniques
1 2.2	No Sy	Name stern Tester	Act_No	Description Performs System Tes.

Figure 218 Process Execution Record of Process Execution #18

SPC - AAT	and human amont Hole				
		>			
PROCESS DATA	M ASSESSM	/IENT	PROCE	SS IMPROVEMENT	
Process Executions O Metr Process Execution Records ProRecRecSel	Process Execution Record	Detail Outputs Activities	Roles Tools &	Techniques	
1 25CA. ⊭ 2 25CA. ⊭ 3 25CA. ⊭ 4 25CA. ⊭ 5 25CA. ⊭ 6 25CA. ⊭ 7 25CA. ⊭ 8 25CA. ⊭ 9 25CA. ⊭ 10 25CA. ⊭ 11 25CA. ⊭ 12 25CA. ⊭ 13 25CA. ⊭ 14 25CA. ⊭ 15 25CA. ⊭	No 1 Ir 2 M 3 M 4 C	Name Internet Explorer 1 IIcrosoft Word 1 IIcrosoft Excel 1 A Harvest 1	Act_No	Description Web Browser Word Document Excel Sheet Configuration Mana	
16 25 C.A ⊭ 17 25 C.A ⊭ 18 25 C.A ⊭				Save Executio	in Record

Figure 219 Process Execution Record of Process Execution #18

C. METRIC USABILITY QUESTIONNAIRES OF CASE STUDIES A, B

SPC-AM Assets

Metric Usability Questionnaires of Case Study A

PROCESS DATA	M ASSESSMENT	PROCESS IMPROVEMENT
Consistency Assessment 🔹 Metrics	Evaluation	
ase Metrics Derived Metrics		
rocess Metrics	Metric Usability Assess	ment Detail
Metric Name Metric Usability	General Info Ques	tionnaire Usability Rating
unction Point 🔘 Usable	Metric Name:	# Test Cases Defined for Bystem Testing
	Conceptual Definition:	Total Number Test Cases Defined for System Testing
	Assessed On:	May 25, 2007

Figure 220 Metric Usability Questionnaire of "# Test Cases" Base Metric

P PROCESS DATA	M ASSESSMENT	PROCESS IMPROVEMENT		
Consistency Assessment Metrics Se Metrics Derived Metrics	Evaluation			
Metric Name Metric Usability Test Cases Usable est Case Ere Usable	General Info Questi Metric Identity	Innnaire TIsability Rating Question	Answer	1
Failed Test. Usable unction Point Usable	Data Veritability Data Dependability Data Nermalizability Data Infegrability	Minki the name of the metric? Minki centry does the metric measure? Minki centry does the motive centry does the metric measure? Minki attribute of the endpic does the metric data? Minki the bego of the metric data? (specify metric formula if the ty, Minki the could be metric data? (specify metric formula if the ty, Minki the could be metric data? (specify metric formula if the ty, Minki the type of the metric data? Minki the could be metric data? Minki the type of the metric data? Minki the range of the metric data?		

Figure 221 Metric Usability Questionnaire of "# Test Cases" Base Metric

-C-AAT			- P
space Assessment Process Impro	vement Help		
PROCESS DATA	M ASSESSMENT	PROVEMENT	
onsistency Assessment 🔹 Metrics E	valuation		
e Metrics Derived Metrics			
ocess Metrics	Metric Usability Assessment Detail		
TelCase U Usable Pased Fet. Usable	Metric Usability Atributes Metric Usability Atributes Data Dependability Data Dependability	Rating F L L L	Expected Rating
			Save Metric Usability Assessment

Figure 222 Metric Usability Questionnaire of "# Test Cases" Base Metric

👙 SPC - AAT	
Workspace Assessmen	nt Process Improvement Help
PROCESS DATA	M ASSESSMENT
O Consistency Assessm	ent
Base Metrics Derived	Metrics
Process Metric # Tes ♥ U # Tes ♥ U # Pa ♥ U	Metric Usability Assessment Detail General Info Questionnaire Usability Rating
# Fail 😏 U Funct 🕤 U	Metric Name: Test Case Execution Time
	Conceptual Definition: Test Case Execution Time Spent for System Testing
	Assessed On: 25.May.2007
	Assessed By: C.ALTUN
	Save Metric Usability Assessment

Figure 223 Metric Usability Questionnaire of "Test Case Execution Time" Base Metric

👙 SPC - AAT			
Workspace Assessment	Process Improvement	lelp	
	1 😼 📚		
PROCESS DATA	MA	SSESSMENT PROCESS IMPROVEMENT	NT
O Consistency Assessmen	t		
Base Metrics Derived M	etrics		
Process Metrics	Metric Usability Assessm	ent Detail	
Metric Metric	General Info Questio	nnaire Usability Rating	
# Tes 💙 U	Metric Identity		
#Pa 🕤 U 🞽	Data Existence	Q Question	Ar -
# Fail 🔵 U	Data Verifiability	1 What is the name of the metric?	Test Case Execution II
Funct 😏 U	Data Dependability	2 Which entity does the metric measure?	Human Resource
	Data Normalizability	3 Which attribute of the entity does the metric measure?	Number (second)
	Data Integrability	4 What is the type of the metric? (direct, indirect)	Direct
		5 How is metric data calculated? (specify metric formula if the ty	
		b What is the scale of the metric data? (nominal, ordinal, interva 2 late the track of the metric data?)	Absolute
		/ what is the unit of the metric data?	
		What is the type of the metric data?	Integer
		a what is the range of the methodata?	
		Usability Rating: 📄 F 💌	
		Save Metri	c Usability Assessment

Figure 224 Metric Usability Questionnaire of "Test Case Execution Time" Base Metric

SPC - AAT Workspace Assessment	Process Improvement Help				
	i 📂 婱 💡				
PROCESS DATA	M ASSESSMENT		PROCESS IM	IPROVEMENT	
O Consistency Assessmen	t Metrics Evaluation				
Process Metrics	Metric Usability Assessment Detail				
MetricMetric	General Info Questionnaire Us	ability Rating			
Test O U	Metric Usability Attributes	Rating		Expected Rating	
#Pa 💆 U	Data Existence	F C	F		
Funct O U	Data Verifiability	🔵 F	L		
	Data Dependability	📃 🔵 L	L		
				Savo Motric Lleability Acc	
				Save metric USability ASS	essment

Figure 225 Metric Usability Questionnaire of "Test Case Execution Time" Base Metric

👙 SPC - AAT				- • ×
Workspace Assessment	Process Improvement	Help		
] 💅 ≽			
PROCESS DATA	M	ASSESSMENT	PROCESS IMPROVEMENT	
O Consistency Assessme	ent Metrics Evaluation Metrics	I		
Process Metrics	-Metric Usability Assess	ment Detail		
MetricMetric	General Info Quest	ionnaire Usability Rating		
# Tes U Test U # Pa U # Fail U Funct U	Metric Name: Conceptual Definition:	# Passed Test Cases Total Number of Passed Test Cases D	Defined for System Testing	
	Assessed On:	25.May.2007		
	Assessed By:	C.ALTUN		
			Save Metric Usability Asso	essment
	10			

Figure 226 Metric Usability Questionnaire of "# Passed Test Cases" Base Metric

👙 SPC - AAT					
Workspace Assessment	Process Improvement	Help			
	1	(
PROCESS DATA	MA	SSE	SSMENT PROCESS IMPROVEME	NT	
O Consistency Assessment	Metrics Evaluation				
Base Metrics Derived Me	trics				
Process Metrics	Metric Usability Assessm	ent l	Detail		
MetricMetric	General Info Questio	nna	IIsability Rating		
# Tes 🔵 U			County racing		
Test 😏 U	Metric identity	Q	Question	Ar	1 📥 📗
# Pa 0 U	Data Marifiability	1	What is the name of the metric?	# Passed Test Cases	
Funct 🕤 U	Data Dopondability	2	Which entity does the metric measure?	Number	
	Data Normalizability	3	Which attribute of the entity does the metric measure?	Test Case Number	
	Data Integrability	4	What is the type of the metric? (direct, indirect)	Direct	
	Data intogramity	5	How is metric data calculated? (specify metric formula if the ty		
		6	What is the scale of the metric data? (nominal, ordinal, interva	Absolute	
		7	What is the unit of the metric data?	Number	
		8	What is the type of the metric data? (integer, real, etc.)	Integer	
		9	What is the range of the metric data?	[0.0,Infinity]	-
			Usability Rating: 🌔 F 💌		
			Save Metr	ic Usability Assessmen	ıt

Figure 227 Metric Usability Questionnaire of "# Passed Test Cases" Base Metric

SPC - AAT Workspace Assessment	Process Improvement Help			
PROCESS DATA	M ASSESSMENT		PROCESS IMPROVEMENT	
Consistency Assessment	t Metrics Evaluation etrics Metric Usability Assessment Detail General Info Questionnaire Usa Metric Usability Attributes Metric Identity Data Existence Data Verifiability Data Dependability	bility Rating Rating F F F L	Expected Ratin F F L L Save Metric Usability	g

Figure 228 Metric Usability Questionnaire of "# Passed Test Cases" Base Metric

SPC - AAT	
PROCESS DATA	M ASSESSMENT
○ Consistency Assessment	uation
Base Metrics Derived Metrics	essesment Detail
MetricMetric General Info # Tes U # Pa U	Questionnaire Usability Rating
Funct	# Failed Test Cases
Conceptual Defin	ition: Total Number of Failed test cases defined for System Testing
Assessed On:	25.May.2007
Assessed By:	CALTUN
	Save Metric Usability Assessment

Figure 229 Metric Usability Questionnaire of "# Failed Test Cases" Base Metric

SPC - AAT Workspace Assessment	Process Improvement	Help			
	1 😼 놀	\bigcirc			
PROCESS DATA	M A	SSESSMENT	PROCESS IMPROVEME	NT	
Consistency Assessment	Metrics Evaluation etrics	vent Detail			
Metric Metric # Tes ● U # Pa ● U # Fa ● U # Fa ● U Funct ● U	General Info Question	onnaire Usability Rating			
	Data Existence Data Verifiability Data Dependability Data Normalizability Data Integrability	due d	asure? : the metric measure? ilrect, indirect) specify metric formula if the ty ata? (norminal, ordinal, interva a? iata? (integer, real, etc.) lata?	# Failed Test Cases Number Test Case Number Direct Absolute Number Integer [0.0,30]	
		Us	ability Kating: 💽 F 💌	ic Usability Assessmen	ıt

Figure 230 Metric Usability Questionnaire of "# Failed Test Cases" Base Metric

SPC - AAT Workspace Assessment	Process Improvement Help			
PROCESS DATA	ASSESSMENT		PROCESS IMPROVEMENT	
Consistency Assessmen Base Metrics Derived M Process Metrics	nt Metrics Evaluation letrics Metric Usability Assessment Detail			
Metric Metric # Tes © U # Pa © U # Fail © U Funct © U	General Info Questionnaire Usat Metric Usability Attributes Metric Identity Data Existence Data Verifability Data Dependability	Rating Rating F F F L	Expected Rating F F L L	
			Save Metric Usability A	ssessment

Figure 231 Metric Usability Questionnaire of "# Failed Test Cases" Base Metric

👙 SPC - AAT	چ SPC - AAT					
Workspace Assessment Proces	ss Improvement He	elp				
PROCESS DATA	PROCESS DATA M ASSESSMENT PROCESS IMPROVEMENT					
○ Consistency Assessment ● M	letrics Evaluation					
Base Metrics Derived Metrics						
Process Metrics Metric	Usability Assessme	nt Detail				
#Tes 0 U Test 0 U #Pa 0 U #Fall 0 U Funct 0 U						
Metrie	c Name: Fur	nction Point				
Conce	eptual Definition: Fur	nction Point defined for Each User	r Interface			
Asses	ssed On: 25	.May.2007				
Asses	ssed By: C.A	ALTUN				
			Save Metric Usability Assessment			

Figure 232 Metric Usability Questionnaire of "Function Point" Base Metric

👙 SPC - AAT						
Workspace Assessment F	Process Improvement	Help				
PROCESS DATA	M A	SSESSMENT	PROCESS IMPROVEME	NT		
Consistency Assessment	Metrics Evaluation					
Base Metrics Derived Met	trics					
Process Metrics	Netric Usability Assessm	ent Detail				
# Tes 🕤 U	General IIIO Questi					
Test 🥥 U 🕞	Metric Identity	Q., Que:	stion		Ar	
# Pa 😏 U	Data Existence	1 What is the name of the metric?	8	Function Point		
Funct	Data Vermability	2 Which entity does the metric me	asure?	Software Product	_	
	Data Normalizability	3 Which attribute of the entity does	the metric measure?	Size		
	Data Integrability	4 What is the type of the metric? (c	lirect, indirect)	Direct		
	Data Intogramity	5 How is metric data calculated? (specify metric formula if the ty			
		6 What is the scale of the metric d	ata? (nominal, ordinal, interva	Ratio		
		7 What is the unit of the metric dat	a?	Function Point		
		8 What is the type of the metric dat	ta? (integer, real, etc.)	Real		
		9 What is the range of the metric d	lata?		-	
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Figure 233 Metric Usability Questionnaire of "Function Point" Base Metric

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Figure 234 Metric Usability Questionnaire of "Function Point" Base Metric

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General Info Ques General Info Ques Metric Name: Conceptual Definition: Assessed On:	Test Defect Density Total Number of Executed Test Cases Defined for System Testing May 25, 2007 Table
Assessed By:	CALTUN
Metric Formula	# Failed Test Cases / # Executed Test Cases
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Figure 235 Metric Usability Questionnaire of "Test Defect Density" Derived Metric

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Figure 236 Metric Usability Questionnaire of "Test Defect Density" Derived Metric

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Figure 237 Metric Usability Questionnaire of "Test Defect Density" Derived Metric

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		Data Dependability	12 is all metric data calculated according to metric formula?	Ves	
		Data Normalizability	13 Where is matrix data strend? (in a file, database, etc.)	File	
		Data Integrability	14 is all matrix data stored in the same niare? (in a file databas	Vae	
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Figure 238 Metric Usability Questionnaire of "Test Defect Density" Derived Metric

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fest Effectiven 🧕 Usable 🍡 🏹	Metric Identity	Q Question	Answer	*
Test Speed 🕐 Usable	Data Existence	15 Is metric data stored precisely?	Yes	
	Data Veritiability	16 Is metric data stored for a specific purpose?	Yes	
	Data Normalizability	17 Is the purpose of metric data storage known by process perfor.	Yes	
	Data Normalizability	18 is metric data analyzed and reported?	Yes	
	Data integrability	19 is metric data analysis results communicated to process perf.	Yes	
		20 is metric data analysis results communicated to management?	No	
		21 Is metric data analysis results used as a basis for decision m	Yes	-
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Figure 239 Metric Usability Questionnaire of "Test Defect Density" Derived Metric

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Figure 240 Metric Usability Questionnaire of "Test Defect Density" Derived Metric

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	Data Verifiability	24 Is metric data integrable at organization level?	Yes	
	Data Integrability			-
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Figure 241 Metric Usability Questionnaire of "Test Defect Density" Derived Metric

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Figure 242 Metric Usability Questionnaire of "Test Defect Density" Derived Metric

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Test Effectiven O Usable	Alexandra and a second	
Test Speed 👩 Usable		
	Metric Name:	Test Effectiveness
	Conceptual Definition:	Number of Failed Test Cases per Test Case Execution Time
	Assessed On:	May 25, 2007
	Assessed By:	CALTUN
	Metric Formula	# Failed Test Cases / Test Case Execution Time
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Figure 243 Metric Usability Questionnaire of "Test Effectiveness" Derived Metric

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Figure 244 Metric Usability Questionnaire of "Test Effectiveness" Derived Metric

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Figure 245 Metric Usability Questionnaire of "Test Effectiveness" Derived Metric

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Test Speed 🚫 Usable		Data Existence	10 How is metric data calculated? (by a tool, manually, etc.)	Manually	
		Data Verifiability	11 is all metric data calculated the same way? (by a tool, manuall,	Yes	
		Data Dependability	12 its all metric data calculated according to metric formula?	Yes	
		Data Normalizability	13 Where is metric data stored? (in a file, database, etc.)	File	
		Data Integrability	14 is all metric data stored in the same place? (in a file, databas	Yes	
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Figure 246 Metric Usability Questionnaire of "Test Effectiveness" Derived Metric

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Figure 247 Metric Usability Questionnaire of "Test Effectiveness" Derived Metric

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Figure 248 Metric Usability Questionnaire of "Test Effectiveness" Derived Metric

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Figure 249 Metric Usability Questionnaire of "Test Effectiveness" Derived Metric

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Figure 250 Metric Usability Questionnaire of "Test Effectiveness" Derived Metric

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Test Effectiven	A DESCRIPTION OF THE OWNER	
Test Speed 🕑 Usable 📩		
	Metric Name:	Test Speed
	Conceptual Definition:	Number of Executed Test Cases per Test Case Execution Time
	Assessed On:	May 25, 2007
	Assessed By:	CALTUN
	Metric Formula	# Executed Test Cases / Test Case Execution Time
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Figure 251 Metric Usability Questionnaire of "Test Speed" Derived Metric
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	Data Dependability	3 What is the unit of the metric data?	Number	
	Data Normalizability	4 What is the type of the metric data? (integer, real, etc.)	Real	
	Data integrability	5 What is the range of the metric data?		
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Figure 252 Metric Usability Questionnaire of "Test Speed" Derived Metric

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Figure 253 Metric Usability Questionnaire of "Test Speed" Derived Metric

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lest Speed 👩 Usable	Data Existence 10 How is met	ic data calculated? (by a tool, manually, etc.)	Manually	
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Figure 254 Metric Usability Questionnaire of "Test Speed" Derived Metric

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	Data Normalizability 17 Is the pu	irpose of metric data storage known by process perfor	Yes	
	Data Integrability 18 Is metri	: data analyzed and reported?	Yes	
	19 Is metri	data analysis results communicated to process perf	Yes	
	20 Is metri	data analysis results communicated to management?	No No	
	21 Is metri	data analysis results used as a basis for decision m	Yes	
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Figure 255 Metric Usability Questionnaire of "Test Speed" Derived Metric

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Figure 256 Metric Usability Questionnaire of "Test Speed" Derived Metric

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Metric Usability Test Eber(cube. Usable Test Eber(cube. Usable Data Verrinability Data Dependability Data Normalizability 0 Data Verrinability 21 Is metric data integrable at organization level? Yes 21 Is metric data integrable at organization level? Yes 21 Is metric data integrable at organization level? Yes 21 Is metric data integrable at organization level? Yes 21 Is metric data integrable at organization level? Yes 21 Is metric data integrable at organization level? Yes 21 Is metric data integrable at organization level? Yes 21 Is metric data integrable at organization level? Yes 21 Is metric data integrable at organization level? Yes 21 Is metric data integrable at organization level? Yes 21 Is metric data integrable at organization level? Yes 21 Is metric data integrable at organization level? Yes 21 Is metric data integrable at organization level? Yes 21 Is metric data integrable at organization level? Yes 21 Is metric data integrable at organization level? Yes 21 Is metric data integrable at organization level? Yes 21 Is metric data integrable a	Process Metrics	Metric Usability Assessment Detail			
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Data Verificationelly Za ls metric data integrabile at project level? Yes Za ls metric data integrabile at organization level? Yes Za ls metric data integrabile at organization level? Yes Za ls metric data integrabile Za ls metric data integrabile Data Verificationelly Za ls metric data integrabile Data Verificationelly Za ls metric data integrabile Data Verificationelly Za ls metric data integrabile Data Verificationelly Za ls metric data integrabile Data Verificationelly Za ls metric data integrabile Data Verificationelly Za ls metric data integrabile Data Verificationelly Za ls metric data integrabile Data Verificationelly Za ls metric data integrabile Data Verificationelly Za ls metric data integrabile Data Verificationelly Za ls metric data integrabile Data Verificationelly Za ls metric data integrabile Data Verificationelly Za ls metric data integrabile Data Verificationelly Za ls metric data integrabile Data Verificationelly Za ls metric data integrabile Data Verificationelly Za ls metric data integrabile Data Verificationelly Za l	Test Effectiven O Usable	Metric Identity	Quartian	Anowor	
Data Verificiality Data Dependantity Data Normalizability Data Integrability 24 is metric data integrable at organization level? Yes Data Integrability Data Integrability 24 is metric data integrable at organization level? Yes Save Metric Usability Assessment Save Metric Usability Assessment	Test Speed 🕒 Usable 본	Data Existence 23 Is me	euestion stric data integrable at project level?	Yes	
Data Normatizatility Data Integrability Data Integrability Element Save Metric Usability Assessment		Data Verifiability 24 Is me	etric data integrable at organization level?	Yes	
Save Metric Usability Assessment		Data korrazionity Data integrability			
					Save Metric Usability Assessment

Figure 257 Metric Usability Questionnaire of "Test Speed" Derived Metric

👙 SPC - AAT				- # *
SPC-AAT rkcpace Assessment Process Improvement Help PROCESS DATA Assessment Process Improvement Help PROCESS DATA Assessment Process Improvement PROCESS DATA Assessment Process Improvement PROCESS IMPROVEMENT Consistency Assessment @ Metric Usability Assessment Detail Met				
PROCESS DATA	M ASSESSMENT	PROCESS IMPROVEMENT		
○ Consistency Assessment	valuation			
Base Metrics Derived Metrics	Oper-ANT Image: Construction of the cons			
Process Metrics	Metric Usability Assessment Detail			
Metric Name Metric Usability	General Info Questionnaire Usability Ra	iting		1
Test Effectiven 🔵 Usable 🌍	Metric Usability Attributes	Rating		Expected Rating
Test Speed 🙁 Usable 🔝	Metric Identity		F	
	Data Verifability	- F	F	
	Data Dependability	Ŭ L	L	
	MUF-3&4 for Test Case Execution Time	🔵 L	L	
				=
				
				Save Metric Usability Assessment

Figure 258 Metric Usability Questionnaire of "Test Speed" Derived Metric

Metric Usability Questionnaires of Case Study B

👙 SPC - AAT	Process Investment II-In	
Workspace Assessment		
PROCESS DATA	M ASSESSMENT	PROCESS IMPROVEMENT
O Consistency Assessment	Metrics Evaluation	
Base Metrics Derived Me	etrics	
Process Metrics	Metric Usability Assessment Detail	
MetricMetric	General Info Questionnaire Usability Rating	
# Test 🕤 U		
# Pa 🔵 U	Metric Name: # Test Cases Defined for System Test	ng
Funct 🕤 U	Conceptual Definition: Total Number Test Cases Defined for S	System Testing
	Assessed On: 25.May.2007	
	Assessed By: C.ALTUN	
		Save Metric Usability Assessment

Figure 259 Metric Usability Questionnaire of "# Test Cases" Base Metric

👙 SPC - AAT					• ×	
Workspace Assessment I	Process Improvement	Help				
PROCESS DATA ASSESSMENT PROCESS IMPROVEMENT						
Consistency Assessment	Metrics Evaluation	Ĉ.				
Dase Metrics Derived Met	uics					
Process Metrics	Metric Usability Assessm	nent Detail				
MetricMetric	General Info Questi	ionnaire Usability Rating				
	Metric Identify					
#Pa	Data Existence	Q Question 1 What is the name of the metric? 2 Which entity does the metric measure? 3 Which attribute of the entity does the metric measure?		Ar		
# Fail 🗿 U	Data Verifiability			# Executed Test Cases		
Funct 🔵 U	Data Dependability			Number		
	Data Normalizability			Test Case Number		
	Data Integrability	4 What is the type of the metric? (direct, indirect)	Direct		
		5 How is metric data calculated?	(specify metric formula if the ty	2021		
		6 What is the scale of the metric d	lata? (nominal, ordinal, interva	Absolute		
		7 What is the unit of the metric dat	ta?	Number		
		8 What is the type of the metric da	ta? (integer, real, etc.)	Integer		
		9 What is the range of the metric o	data?	[0.0,30]	-	
	Usability Rating: 👩 F 💌					
	Save Metric Usability Assessment					

Figure 260 Metric Usability Questionnaire of "# Test Cases" Base Metric

👙 SPC - AAT						- • ×
Workspace Asse	ssment P	Process Improvement Help				
PROCESS D	ATA	M ASSESSMENT		PROCESS	IMPROVEMENT	
O Consistency As	sessment	Metrics Evaluation				
Base Metrics	Derived Met	rics				
Process Metrics # Tes U # Test U # Pail U # Fail U		Iterric Usability Assessment Detail General Info Questionnaire Usa Metric Usability Attributes Metric Usability Attributes Data Existence Data Existence Data Verifability Data Verifability Data Dependability Data Dependability Data Dependability	ability Rating Rating F E L L		Expected Rating	essment

Figure 261 Metric Usability Questionnaire of "# Test Cases" Base Metric

👙 SPC - AAT				
Workspace Assessment	Process Improvement	Help		
] 💅 🍃			
PROCESS DATA	M	ASSESSMENT	PROCESS IMPROVEMENT	
Consistency Assessment	t	n		
Base metrics Derived me	errics			
Process Metrics	Metric Usability Assess	ment Detail		
MetricMetric	General Info Ques	tionnaire Usability Rating		
Test O U #Pa O U				
# Fail 🔵 U	Metric Name:	Test Case Execution Time		
	Conceptual Definition:	Test Case Execution Time Spent for Sy	/stem Testing	
	Assessed On:	25.May.2007		
	Assessed By:	C.ALTUN		
			Save Metric Usability Ass	sessment
			L	

Figure 262 Metric Usability Questionnaire of "Test Case Execution Time" Base Metric

SPC - AAT Workspace Assessment	Process Improvement	Help			•
PROCESS DATA A ASSESSMENT PROCESS IMPROVEMENT Convictorize Assessment Matrice Evaluation					
Base Metrics Derived Metrics Process Metrics Metric Usability Assessment Detail Metric. Image: Comparison of the metric of the of the metric of the metr					
Usability Rating: 🕞 F 💌					t

Figure 263 Metric Usability Questionnaire of "Test Case Execution Time" Base Metric

👙 SPC - AAT				
Workspace Assessment	Process Improvement Help			
	I 📂 📚 💡			
PROCESS DATA	M ASSESSMENT		PROCESS IMPROVEMENT	
Consistency Assessment Base Metrics Derived M Process Metrics Metric. Metric.	t Metrics Evaluation etrics Metric Usability Assessment Detail General Info Questionnaire Usa	bility Rating		
Test 😏 U	Metric Usability Attributes	Rating	Expected Ratin	
#Pa 💆 U	Metric Identity			
#Fall OU	Data Existence		F	
	Data Dependability	ŏi	E	
			Save Metric Usability A	Assessment

Figure 264 Metric Usability Questionnaire of "Test Case Execution Time" Base Metric

2 SPC - AAT	- • •
Vorkspace Assessment Process Improvement Help	
PROCESS DATA MASSESSMENT PROCESS IMPROVEMENT	
Consistency Assessment	
Base Metrics Derived Metrics	
Process Metrics	
Metric Metric	
# Tes O U H Test O U # Pa O U	
#Fail OU Metric Name: #Passed Test Cases	
Conceptual Definition: Total Number of Passed Test Cases Defined for System Testing	
Assessed On: 25.May.2007	
Assessed By: C.ALTUN	
Save Metric Usability Asses	sment

Figure 265 Metric Usability Questionnaire of "# Passed Test Cases" Base Metric

👙 SPC - AAT				
Workspace Assessment	Process Improvement	Help		
	1			
PROCESS DATA	M A	SSESSMENT	PROCESS IMPROVEME	NT
 Consistency Assessment 	Metrics Evaluation			
Base Metrics Derived Me	etrics			
Process Metrics	Metric Usability Assessm	nent Detail		
#Tes 😏 U	Metric Identity			
#Pa 🕤 U 본	Data Existence	Q Que:	stion	Ar -
# Fail 🧿 U	Data Verifiability	What is the name of the metric ? Which on the door the metric me	2011/20	# Passeu resi Cases
Funct 😈 U	Data Dependability	2 Which attribute of the entity does	the metric measure?	Tect Cace Number
	Data Normalizability	4 What is the type of the metric? (c	lirect indirect)	Direct
	Data Integrability	5 How is metric data calculated?	energify metric formula if the ty	
		6 What is the scale of the metric d	ata? (nominal ordinal interva	Absolute
		7 What is the unit of the metric dat	a?	Number
		8 What is the type of the metric dat	ta? (integer, real, etc.)	Integer
		9 What is the range of the metric d	lata?	[0.0,Infinity]
		Us	ability Rating: 🔵 F 💌	· [V
			Save Metri	ic Usability Assessment

Figure 266 Metric Usability Questionnaire of "# Passed Test Cases" Base Metric

SPC - AAT Workspace Assessme	nt Process Improvement Help		
PROCESS DATA		PROCESS	IMPROVEMENT
Consistency Assessr Base Metrics Process Metrics MetricMetric	eent Metrics Evaluation Metrics Metric Usability Assessment Detail General Info Questionnaire Usability	Rating	
# Tes ♥ U Test ♥ U # Pa ♥ U # Fail ♥ U Funct ♥ U	Metric Usability Attributes Metric Identity Data Existence Data Verifiability Data Dependability	Rating F F F F F L L L	Expected Rating
		[Save Metric Usability Assessment

Figure 267 Metric Usability Questionnaire of "# Passed Test Cases" Base Metric

👙 SPC - AAT 📃 🗖 🗖 💽
Workspace Assessment Process Improvement Help
PROCESS DATA
Consistency Assessment Metrics Evaluation
Base Metrics Derived Metrics
Process Metrics Metric Usability Assessment Detail General Info Questionnaire Usability Rating Feat. U
Funct U Metric Name: #Failed Test Cases
Conceptual Definition: Total Number of Failed test cases defined for System Testing
Assessed On: 25.May.2007
Assessed By: C.ALTUN
Save Metric Usability Assessment

Figure 268 Metric Usability Questionnaire of "# Failed Test Cases" Base Metric

👙 SPC - AAT						
Workspace Assessment	Process Improvement	Help				
			\rangle			
PROCESS DATA	MA	SSESSN	IENT	PROCESS IMPROVEME	NT	
O Consistency Assessment	Metrics Evaluation					
Base Metrics Derived Me	trics					
Process Metrics	Metric Usability Assessn	nent Det	ail			
MetricMetric	General Info Questi	onnaire	Usability Rating			
# les 0 U	Metric Identity				2	
#Pa 🕤 U 🞽	Data Existence	Q	Que	stion	A	4-11
# Fail 😏 U	Data Verifiability	1 VVI	hat is the name of the metric?		#Failed Test Cases	-
Funct 😇 U	Data Dependability	2 VVI	nich entity does the metric me	asure?	Number	- 1711
	Data Normalizability	3 VVI	nich attribute of the entity does	s the metric measure?	Test Case Number	-
	Data Integrability	4 991	rai is the type of the metho? (t	arrect, marrect) (an acify matrix formatula if the ty	Direct	
		E WA	wis metric data calculated / i	(specily metric formula if the ty	Abooluto	-
		7 90	at is the unit of the metric def	ialar (nonnial, orunial, interva	Ausolule	
		0 54/4	at is the type of the metric da	ta? (intodor rool otc.)	Integer	-
		a sar	hat is the type of the metric of	tar (integer, real, etc.) toto?	10 0 301	
		0 00	iario ne range of the method	4010 :	[0.0,00]	
			Us	ability Rating: 👩 F 🔽		
				Save Metr	ic Usability Assessmer	nt

Figure 269 Metric Usability Questionnaire of "# Failed Test Cases" Base Metric

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PROCESS DATA	M ASSESSMENT		PROCESS IMPR	ROVEMENT	
Consistency Assessme Base Metrics Derived M Process Metrics	nt Metrics Evaluation Aetrics Metric Usability Assessment Detail				
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			Sa	ve Metric Usability Asse	ssment

Figure 270 Metric Usability Questionnaire of "# Failed Test Cases" Base Metric

👙 SPC - AAT		
Workspace Assessment	Process Improvement Help	
PROCESS DATA	ASSESSMENT	PROCESS IMPROVEMENT
O Consistency Assessment	t Metrics Evaluation	
Base Metrics Derived Me	etrics	
Process Metrics MetricMetric # Tes U # Pa U # Fail U Funct U	Metric Usability Assessment Detail	
	Metric Name: Function Point	
	Conceptual Definition: Function Point defined for Each User In	iterface
	Assessed On: 25.May.2007	
	Assessed By: C.ALTUN	
		Save Metric Usability Assessment

Figure 271 Metric Usability Questionnaire of "Function Point" Base Metric

👙 SPC - AAT					
Workspace Assessment	Process Improvement	Help			
	1 💅 📚				
PROCESS DATA	M A	SSESSMENT	PROCESS IMPROVEME	NT	
 Consistency Assessment 	Metrics Evaluation				
Base Metrics Derived Me	etrics				
Process Metrics	Metric Usability Assessm	nent Detail			
Metric Metric	General Info Questio	onnaire Usability Rating			
# les 0 U	Metric Identity	(re-r		1	
#Pa 🕤 U 💌	Data Existence	Q Ques	stion	Evention Dates	Ar
#Fail 🔵 U	Data Verifiability	Vinat is the name of the metho?		Function Point	
Funct 😏 U	Data Dependability	2 Which entity does the metric measure? 3 Which attribute of the entity does the metric measure? 4 Which attribute of the metric? (direct indirect)		Soliware Product	_ =
	Data Normalizability			Direct	
	Data Integrability	F How is matrix data salculated?	inect, inturiecty	Direct	
		6 What is the scale of the matrix d	specily means formula interva	Patio	
		7 What is the unit of the metric dat	ata: (nominal, ordinal, interva 52	Function Point	
		8 What is the type of the metric dat	ta? (integer real etc.)	Real	
		9 What is the range of the metric d	lata?	rtour	
		o mario no range er no monto a			
		Us	ability Rating: 🔵 F 💌		
			Save Metri	ic Usability Assessm	ent

SPC - AAT Workspace Assessment I	Process Improvement Help			
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Test ♥ U # Pa ♥ U # Fail ♥ U Funct ♥ U	Metric Usability Attributes Metric Identity Data Existence Data Verifiability Data Dependability	Rating F F F L	F F L L	pected Rating
			Save Metr	ric Usability Assessment
	L			

Figure 272 Metric Usability Questionnaire of "Function Point" Base Metric

Figure 273 Metric Usability Questionnaire of "Function Point" Base Metric

orkspace Assessment Process Improvement Help PROCESS DATA PROCESS DATA A ASSESSMENT PROCESS IMPROVEMENT Consistency Assessment Mark Name Consistency Assessment Mark Name Consistency Assessment Mark Name Consistency Assessment Mark Name Consistency Assessment Mark Name Consistency Assessment Mark Name Consistency Assessment Mark Name Consistency Consisten	
PROCESS DATA MA ASSESSMENT PROCESS INPROVEMENT Consistency Assessment Matrice Evaluation consistency Assessment Matrice Evaluation consistency Matrice Matrice Process Intervent Consistence Consequence	
PROCESS DATA M ASSESSMENT PROCESS MAPROVEMENT Consistency Assessment * Metrics Evaluation Assessment * Metrics Evaluation Mode Number Name Mode Number Name Mode Number Name Vaable Metric Name: Test Defect Density Conceptual Definition: Total Houmber of Executed Test Cases Defined for System Testing Assessed Dr; Assessed Dr; CALTURN	
Consistency Assessment Horrice Evaluation Horrice Metrices Process Metrics Process Metrics Process Metrics Process Metrics Usability Assessment Detail Metric Name Metric	
lase Metrics DerAved Metrics Process Metrics Metric Usability Assessment Detail Metric Usability Council Info Ouestionnaire Usability Rating Metric Name Metric Name: Fest Defect Density Metric Name: Test Defect Density Conceptual Definition: Test Name of Failed Test Cases Per Total Number of Executed Test Cases Defined for System Testing Assessed On: May 25, 2007 Assessed On: CALTURY	
Process Matrics Matric Name Matric Usability Assessment Detail General Info Ouestionnaire Usability Rating General Info Ouestionnaire Usability Rating Matric Name Matric Name Fest Cefect Density Conceptual Definition: Total Rumber of Failed Test Cases Per Total Rumber of Executed Test Cases Defined for System Testing Assessed On: May 52, 2007 Assessed On: CALTUR	
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Test Speed Ousble Metric Name: Test Defect Density Conceptual Definition: Total Number of Failed Test Cases Per Total Number of Executed Test Cases Defined for System Testing Assessed On: May 25, 2007 Assessed Dy: CALTUR	
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Conceptual Definition: Total Number of Failed Test Cases Per Total Number of Executed Test Cases Defined for System Testing Assessed Or: May 25, 2007 Assessed Dy: CALTUN	
Assessed On: May 25, 2007 Assessed Dy: C ALTUN	
Assessed Dy: CALTUN	
Metric Formula # Failed Test Cases / # Executed Test Cases	
Save Metric Usability /	
	ssessment

Figure 274 Metric Usability Questionnaire of "Test Defect Density" Derived Metric

Process DATA	s Improve	M ASSESSMENT	PROCESS IMPROVEMENT		
Consistency Assessment M	etrics Eva	luation			
Mohin Name Metric Usability Test Deter De. Usabile Test Speed Usable Usable		General Info General Info Data Existence Data Verifability Data Dependability Data Normalizability Data Infogrability	Orabitry Rating Orabitry Rating Orabitry Rating Orabitry Rating Orabitry Rating Orabitry Rating Orabitry Rating Orabitry Rating Orabitry Orabitry Rating Orabitry Or	Angwer base metr # Failed Test Cases / UFP nsl. interva Ratio c) Real c) Real j0.0,infinity Infinity	
				Usability Rating: 👩 T 💌 Save Metric Us	ability Assessment

Figure 275 Metric Usability Questionnaire of "Test Defect Density" Derived Metric



Figure 276 Metric Usability Questionnaire of "Test Defect Density" Derived Metric

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orkspace Assessment Proces	s Improve	ement Help			
	3)			
PROCESS DATA		M ASSESSMENT	PROCESS IMPROVEMENT		
Consistency Assessment M	letrics Eva	aluation			
ase metrics Derived metrics					
Process Metrics		Metric Usability Assessn	nent Detail		
Metric Name Metric Usability Test Defect De	Ľ	General Info Questi	onnaire Usability Rating		
Test Effectiven 🔵 Usable		Metric Identity	Question	Answer	*
Test Speed [Usable		Data Existence	10 How is metric data calculated? (by a tool, manually, etc.)	Manually	
		Data Dependability	11 is all metric data calculated the same way? (by a tool, manuall.	Yes	
		Data Normalizability	12 is all metric data calculated according to metric formula?	Yes	
		Data Integrability	13 Where is metric data stored? (in a file, database, etc.)	File	
			14 Is all metric data stored in the same place? (in a file, databas	Ves	
			Usab	ðity Rating: 🔁 L 💌	
				Save M	Metric Usability Assessment

Figure 277 Metric Usability Questionnaire of "Test Defect Density" Derived Metric

sspace Assessment Process Improvement Help Process DATA A ASSESSMENT A ASSESSMENT A ASSESSMENT A ASSESSMENT A ASSESSMENT A ASSESSMENT A ASSESSMENT A ASSESSMENT A ASSESSMENT A ASSESSMENT A ASSESSMENT A ASSESSME	SPC - AAT					- Q
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ee Metrice Derived Metrics	Consistency Assessment 🔹 Met	trics Eva	luation			
Motic Usability Assessment Detail Metric Vasible Metric Vasible Detail <td>se Metrics Derived Metrics</td> <td></td> <td></td> <td></td> <td></td> <td></td>	se Metrics Derived Metrics					
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ext Cpred Usable Usable 15 In metric data stored precipies? Yes Data Dependatility Data Dependatility 16 In metric data stored precipies? Yes 10 In metric data stored precipies? Yes 15 In metric data stored precipies? Yes 11 In metric data stored precipies? Yes Yes 16 In metric data stored precipies? Yes 12 In metric data stored precipies? Yes Yes 17 In the purpose of metric data stored precipies? Yes 19 In metric data analysis results usemunicated to process precific. Yes 19 In metric data analysis results used as a Dasis for decision m Yes 20 Is metric data analysis results used as a Dasis for decision m Yes 15 In metric data analysis results used as a Dasis for decision m Yes 21 Is metric data analysis results used as a Dasis for decision m Yes Image: calcular c	est Effectiven 🥥 Usable		Metric Identity	Question	Answer	1 12
Data Verification 10 is metric data stored for a specific purpose? Vision Data Normalizability 11 is the purpose of metric data storage anoun by process perficience was a standard and reported? Vision Data Merginality 12 is metric data analysis areautic communicated to process perficience was a standard and reported? Vision 10 is metric data analysis results communicated to process perficience Vision Vision 12 is metric data analysis results used as a basis for decision m (Vision Vision Vision 12 is metric data analysis results used as a basis for decision m (Vision Vision Vision 13 is metric data analysis results used as a basis for decision m (Vision Vision Vision 13 is metric data analysis results used as a basis for decision m (Vision) Vision Vision 14 is metric data analysis results used as a basis for decision m (Vision) Vision Vision 14 is metric data analysis results used as a basis for decision m (Vision) Vision Vision 15 is metric data analysis results used as a basis for decision m (Vision) Vision Vision 15 is metric data analysis results used as a basis for decision m (Vision) Vision) Vision Vision)	est Speed [Usable		Data Existence	15 Is metric data stored precisely?	Yes	1
Data Dependiality 11 Is the purpose of metric data storage known by process performed by the service data storage known by process performed by the service data analysis results communicated to process performed by the service data analysis results communicated to process performed by the service data analysis results used as a basis for decision m			Data Verifiability	16 is metric data stored for a specific purpose?	Yes	1
Udia formatizationy Tell Is metric data analysis and reported? Ves Tota bridgerability Tell Is metric data analysis results communicated to process perf. Ves Tota bridgerability Tell Is metric data analysis results communicated to process perf. Ves Tota bridgerability Tell Is metric data analysis results communicated to process perf. Ves Tota bridgerability Tell Is metric data analysis results used as a basis for decision m Ves Ves Tell Is metric data analysis results used as a basis for decision m Ves Ves Ves Usability Reting: Tell Is metric Usability Assessment Save Metric Usability Assessment			Data Dependability	17 Is the purpose of metric data storage known by process perfor	Yes	1
Data biergerability 16 is metric data analysis results communicated to process perf. Ves 20 is metric data analysis results communicated to management? No 21 is metric data analysis results used as a basis for decision mYes 21 is metric data analysis results used as a basis for decision mYes Usability Retire: Usability Retire: Save Metric Usability Assessment			Data Normalizability	18 is metric data analyzed and reported?	Yes	1
20 Is metric data analysis results communicated to management? No 21 Is metric data analysis results used as a basis for decision mYes 21 Is metric data analysis results used as a basis for decision mYes Usobility Reling: ① L ▼ Save Metric Usability Assessment			Data Integrability	19 is metric data analysis results communicated to process perf.	Yes	
21 Is metric data analysis results used as a basis for decision m				20 is metric data analysis results communicated to management?	No	
Usability Rating: OL Save Motric Usability Assessment				21 Is metric data analysis results used as a basis for decision m	Yes	1
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Figure 278 Metric Usability Questionnaire of "Test Defect Density" Derived Metric

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Figure 279 Metric Usability Questionnaire of "Test Defect Density" Derived Metric

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Test Speed 👩 Usable	Data Existence	23 Is metric data integrable at project level?	Yes	
	Data Verifiability	24 Is metric data integrable at organization level?	Yes	
	Data Integrability			-
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Figure 280 Metric Usability Questionnaire of "Test Defect Density" Derived Metric

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Figure 281 Metric Usability Questionnaire of "Test Defect Density" Derived Metric

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	Metric Name	Tast Effartivanass
	Conceptual Definition:	Number of Failed Test Cases per Test Case Execution Time
	Assessed On:	May 25, 2007
	Assessed By:	Calitun
	Metric Formula	# Failed Test Cases / Test Case Execution Time
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Figure 282 Metric Usability Questionnaire of "Test Effectiveness" Derived Metric

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Figure 283 Metric Usability Questionnaire of "Test Effectiveness" Derived Metric

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Figure 284 Metric Usability Questionnaire of "Test Effectiveness" Derived Metric

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	Data Dependability	11 is all metric data calculated the same way? (by a tool, manuall.	Yes	
	Data Normalizability	12 is all metric data calculated according to metric formula?	Yes	
	Data Integrability	13 Where is metric data stored? (in a file, database, etc.)	File	
		14 is all metric data stored in the same place? (in a file, databas	Yes	
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Figure 285 Metric Usability Questionnaire of "Test Effectiveness" Derived Metric

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Figure 286 Metric Usability Questionnaire of "Test Effectiveness" Derived Metric

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Figure 287 Metric Usability Questionnaire of "Test Effectiveness" Derived Metric

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Figure 288 Metric Usability Questionnaire of "Test Effectiveness" Derived Metric

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Figure 289 Metric Usability Questionnaire of "Test Effectiveness" Derived Metric

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Figure 290 Metric Usability Questionnaire of "Test Speed" Derived Metric

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	Data Normalizability 3 What i	the unit of the metric data?	Number			
	Data Integrability 4 What i	the type of the metric data? (integer, real, etc.)	Real			
	5 What i	the range of the metric data?				
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Test Speed [😏 Usable 📃 🛄	Data Existence	Is metric data existent?	Yes			
	Data Verifiability 7	What is the amount of overall observations?	18			
	Data Normalizability	What is the amount of missing data points?	0			
	Data Integrability	Are data points missing in periods? (if yes, please state obse	No			
				-		
		Usabi	lity Rating: 📑 F 💌			
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Figure 292 Metric Usability Questionnaire of "Test Speed" Derived Metric

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Test Speed G Usable	Data Existence	Question	Answer	i i i i i i i i i i i i i i i i i i i		
	Data Verifiability	How is metric data calculated? (by a tool, manually, etc.)	Manually			
	Data Dependability	is all metric data calculated the same way? (by a tool, manuall	Yes			
	Data Normalizability	Is all metric data calculated according to metric formula?	Yes			
	Data Integrability	Where is metric data stored? (in a file, database, etc.)	File			
	14 1	is all metric data stored in the same place? (in a file, databas	Yes			
		Usabi	lify Rating:			
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Figure 293 Metric Usability Questionnaire of "Test Speed" Derived Metric

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Test speed	Data Vorifiability	15 Is metric data	a stored precisely?	Yes	
	Data Dependability	16 Is metric data	a stored for a specific purpose?	Yes	
	Data Normalizability	17 Is the purpos	e of metric data storage known by process perfor	Yes	
	Data Integrability	18 Is metric data	a analyzed and reported?	Yes	
	Duta integrability	19 Is metric data	a analysis results communicated to process perf	Yes	
		20 Is metric data	a analysis results communicated to management?	No	
		21 Is metric data	a analysis results used as a basis for decision m	Yes	
			Usabi	lify Rating:	Save Metric Usability Assessment

Figure 294 Metric Usability Questionnaire of "Test Speed" Derived Metric

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Workspace Assessment Process Improv	rovement Help	
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	Data Verifiability 22 Can metric data be normalized by parameters or metrics (it y No	
	Data Dependability	
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Figure 295 Metric Usability Questionnaire of "Test Speed" Derived Metric

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Data Normatizatility Data Integrability Data Integrability Element Save Metric Usability Assessment		Data Verifiability 24 Is me	etric data integrable at organization level?	Yes			
Save Metric Usability Assessment		Data Integrability Data Integrability			- - -		
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Figure 296 Metric Usability Questionnaire of "Test Speed" Derived Metric

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Figure 297 Metric Usability Questionnaire of "Test Speed" Derived Metric