How Testers Can Serve Stake-holders: experiences at large multinationals

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Abstract
Structured testing has gained popularity in recent years. The concept of risk and requirements based testing is essentially a test treatment within structured testing. Business Driven Test Management (al., 2008) [i] is an offshoot of Sogeti's structured test method (al. M. P., 2001)[ii] and a relatively new concept in the testing area. Test professionals state that when we speak about risk based testing, we are speaking the language of the stake-holders.
When we speak in terms of risk based testing and business driven test management are we really speaking the language of the stake-holders? In this case as test professionals, are we really serving the stake-holders? How do we measure this?

This paper gives an overview of the structured test methods TMap and TestFrame[iii] risk based testing and business driven test management (BDTM). BDTM is applied with clients every day. We hope that this makes the concepts of structured testing, risk based testing and business driven test management clearer, and that it makes it easier for you to implement these concepts.

Keywords
Structured Testing, Business Driven Test Management, Service Level Agreements

1 Background

When I started this paper I was working for Sogeti hence the focus around BDTM. I kept to the original theme, and am using the original Sogeti materials that I started with. I have made good references to all the original material included in this paper and the accompanying presentation. In the back I have included biographies of those who have largely influenced how we serve our stake-holders in testing.
In 1987 I took a course in TQM (Leadership through Quality) at the Harvard School of Business. This started my journey learning to identify who the customers really are.
In 2001 I started down the path of structured testing when I was introduced to TestFrame by Maartje Kasdorp[iv]. Eventually I went to work for LogicaCMG, and met Bob van de Burgt (Professional Testing), one of the pioneers behind managed testing. I had a short stint with Sogeti via a colleague Rik Marselis, a former colleague at LogicaCMG, and now a Test Strategist with Sogeti in Europe. Logica and Sogeti are recognised as the leaders in structured testing. As a note most of the original contributing members of LogicaCMG and Sogeti's structured test methodologies have left and formed their own test consultancies.
I have worked in 17 different industries, 20 years in testing, the last 8 in structured testing and the last 3 in managed testing. The culmination of this experience results in this paper.
For consistency the paper is written mainly in British English as much of the support material is European.

2 Introduction Structured Testing and Risk & Requirements Based Testing

Essentially there are two significant published structured test methods in the world TestFrame and TMap. Both of these methods were invented in the Netherlands. The Dutch truly understand the art and science of testing. This is significant since currently many other cultures see testing now as simply off-shoring. At the basic level structured testing with TMap is having a master test plan along with individual test plans that include a proper testing life-cycle and techniques that match the test basis and risk. From the TestFrame point of view structured testing is very much the same except it is extended to the test automation part of the testing life-cycle. With TestFrame test design and automation are separate but linked via action words. TestFrame includes a 4th generation test automation framework. Some refer to this in generic terms as a keyword framework. However TestFrame requires that the business specific test actions are extrapolated from an application into action words.

Risk and Requirements Based Testing

On the TMap side the testing life-cycle includes structured test management. On the LogicaCMG side a structured test management model was introduced separately, Successful Test Management (STM).[v] In the TestFrame method the test models or life-cycles are separate, Whereas in TMap the test and test management life-cycles (models) are combined. Prior to the introduction of Successful Test Management Iris Pinkster formerly of LogicaCMG (now with Professional Testing) pioneered the test treatment Risk and Requirements Based Testing (RRBT)[vi]. RRBT is essentially risk based testing and is incorporated directly in the LogicaCMG Test Management Model. The difference between risk based testing and RRBT is that there needs to be a requirement to be able to apply risk. I am introducing RRBT since Iris Pinkster published it in 2002 at Eurostar long before BDTM was published. The principles are much the same essentially we are applying a structured test management method, it is clear who your stake-holders are and the test project and product risks are properly identified. A slight difference might be that in BDTM a business case is identified.

3 BDTM Overview

The key to testing is that tests are executed on the basis of test cases, checklists and the like. But what kind of tests are they? To ensure the tests' usefulness, they must be set up to test those characteristics and parts of a test object that represents a risk if it does not function adequately in production later on. This means that various considerations have already been made before test execution can begin. In other words, some thought has already been given to which parts of the test object need not be tested, and which must be tested and how and with what coverage. Choices must be made in what is tested and how thoroughly. Such choices depend on the risks that an organisation thinks it will incur, the available quantities of time and money, and the result the organisation wishes to achieve. The fact that the choices are based on risks, result, time and cost is called business-driven and constitutes the basis for the BDTM approach.

Characteristics of BDTM

TMap devotes explicit attention to communication due to the business-driven test management approach. BDTM starts from the principle that the selected test approach must enable the client to control the test process and (help) determine the test approach. This gives the testing an economic character. The required information to make this possible is delivered from the test process.
BDTM has the following specific properties:

- The total test effort is related to the risks of the system to be tested for the organisation.
- The estimate and planning for the test process are related to the defined test strategy.
- At various moments in the testing program, the client is involved in making choices.

The steps in BDTM

To understand the BDTM approach, it is important to keep an eye on the final objective. Which is to provide a quality assessment and risk recommendation about the system. The steps of BDTM focus on this:

1. Formulating the assignment and gathering test goals.
2. Determining the risk class for each combination of characteristic and object part.
3. Determining whether a combination of characteristic and object part must be tested thoroughly or lightly.
4. An overall estimate is then made for the test and a planning set up.
5. Allocating test techniques to the combinations of characteristic and object part.
6. Throughout the test process, the test manager provides the client and other stake-holders with adequate insight into and control options over test process and test object.

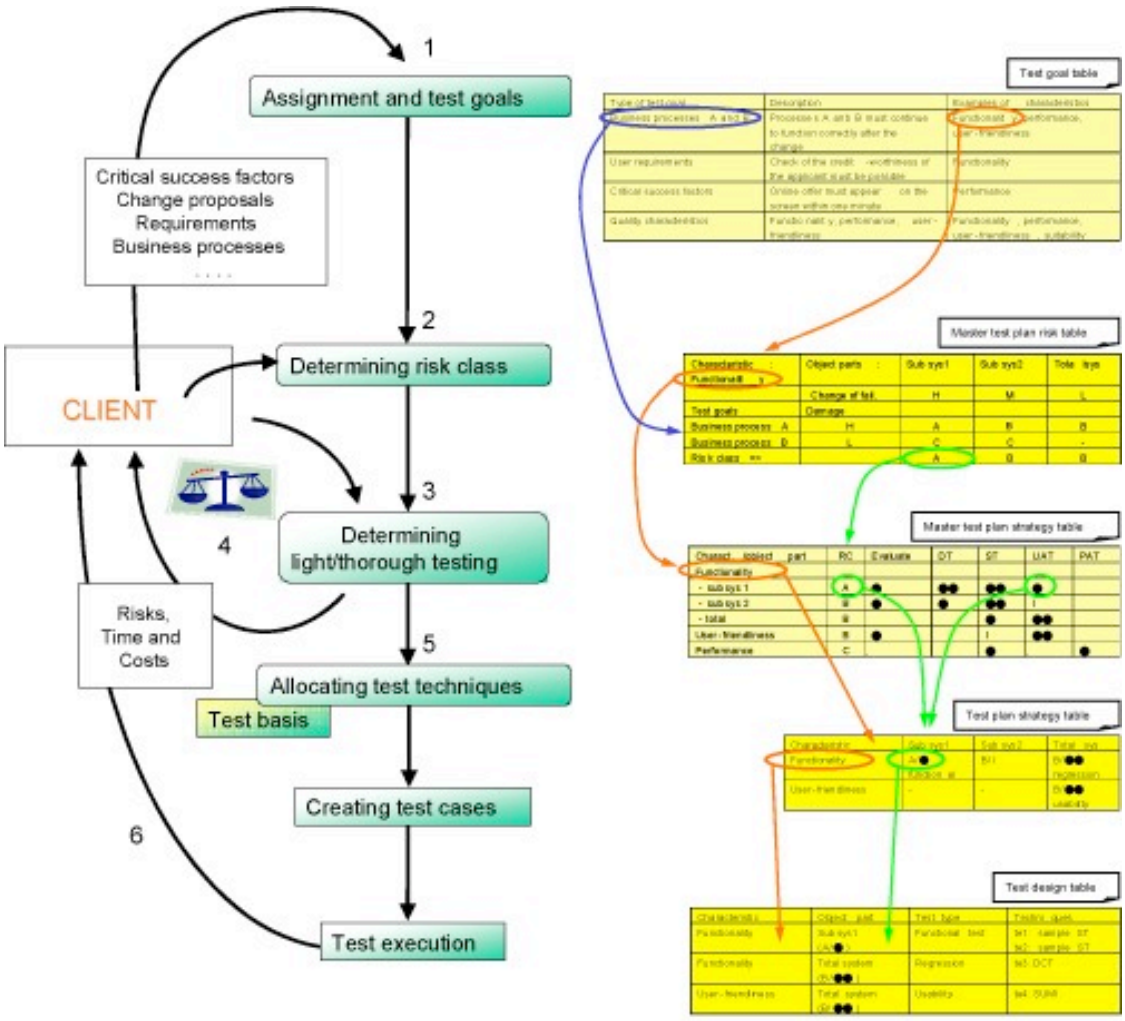


Figure 1 – BDTM Diagram

Advantages of BDTM

The advantages of the BDTM approach are:

- The client having control over the process.
- The test manager communicates and reports in the terminology of the client with information that is useful in the client's context.
- At the master test plan level, detailing can be as intensive as required or possible.

4 Stake-holders

A test project has interaction with many departments and people. Stake-holders[vii] are functionaries of the departments, which have a direct interest in a properly working information system. During a quick scan most stake-holders are identified. Typically we reach out to the stake-holders during the test strategy sessions. We analyse the areas of the information system including departments and document this in the test strategy. To identify the missing stake-holders the following question can be asked. "Who (which department) is responsible for (parts of) the information system?. The stake-holders can categorised in the following way:

- End users;
- Marketing department;
- Service department like the help desk;
- IT departments;
- Internal control / audit.

Organisation structure

Here we describe the organisation structure in an organisation chart.
We make certain the stake-holders can be identified in this chart,
see **Figure 3** – Test Project Stake-holders. This chart is typically detailed in the test strategy within a risk based testing treatment.

Figure 3 – Test Project Stake-holders

TMap does a good job of identifying stake-holders in the requirements phase (see **Figure 2**). I think that this is an often overlooked area in testing. Within TMap in the preparation phase requirements are typically reviewed to make certain that they are testable. But before testing begins the requirements life-cycle occurs. Much of the time what we find is that requirements management is not at an acceptable level.

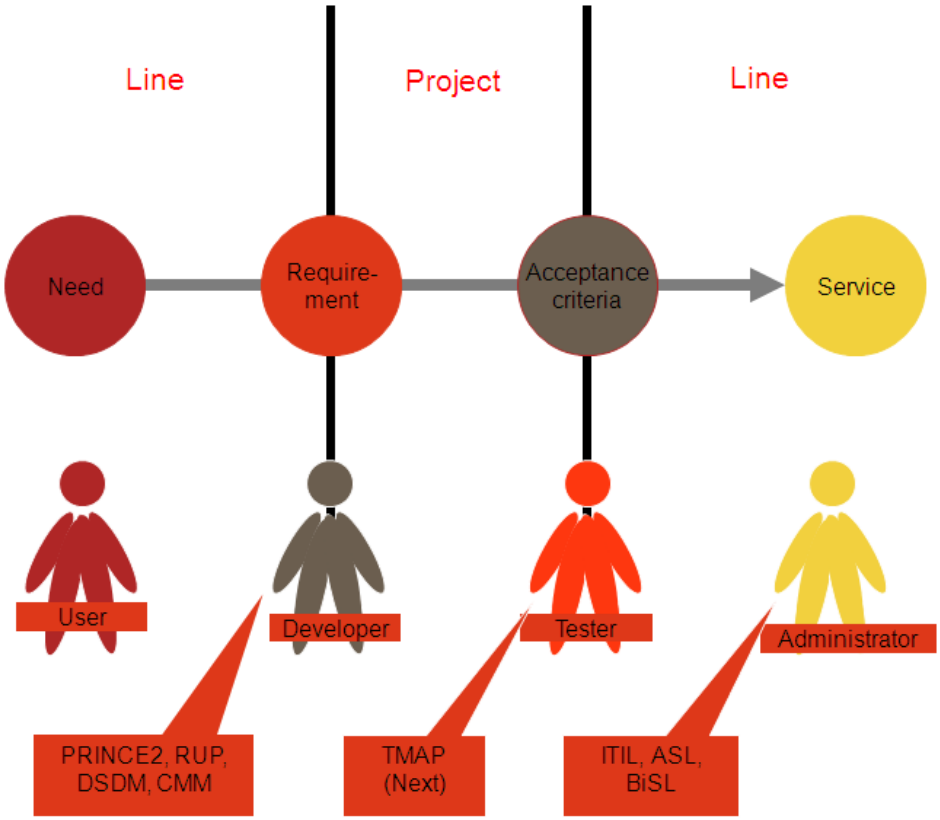


Figure 2 – Stake-holders Frames of Understanding

Delivery Frameworks

Delivery frameworks increased in importance when test outsourcing became a relevant topic within testing. Delivery frameworks have a close relationship with the test project stake-holders. These frameworks are also typically associated with structured testing methods (TestFrame, Tmap etc.) Structured test methods are also role based, which eliminates issues where resources have to deliver in more than one area. A good negative example of this is when the test lead is the test manager, analyst and automation developer. These frameworks help ensure proper delivery of the test assignment, but also give the stake-holders a confidence level. When you are a third party supplier of testing services the client needs assurance that delivery will not be an issue. Delivery

frameworks are typically facilitated through testing workshops with the stake-holders mentioned previously.

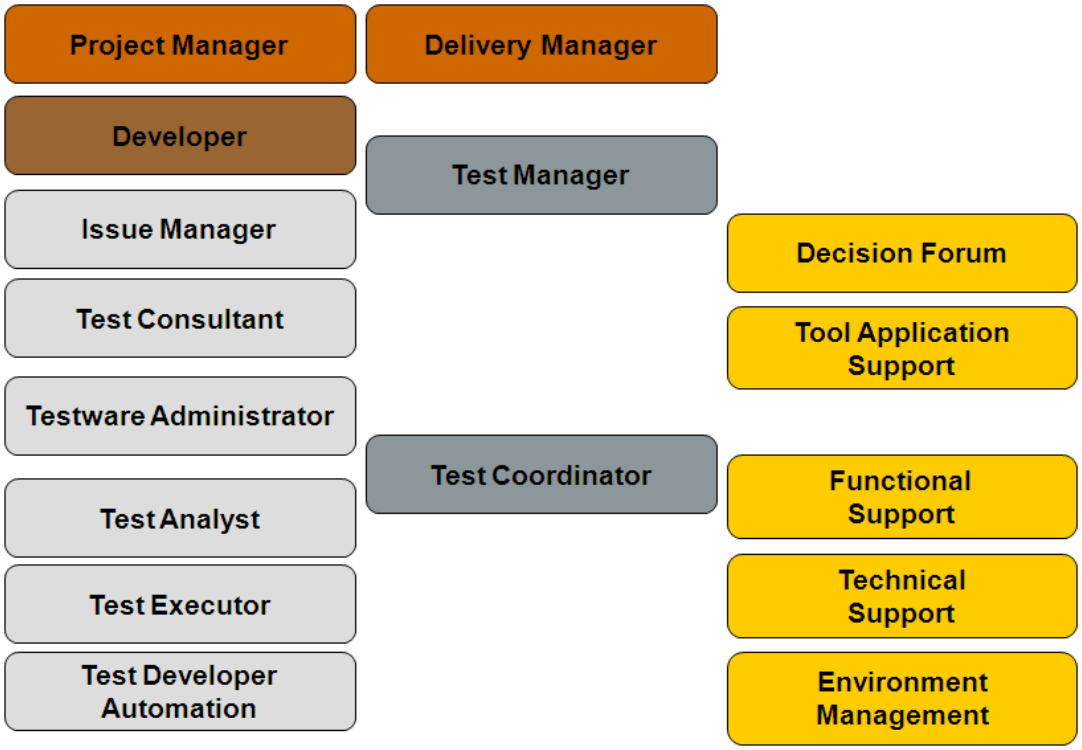


Figure 4 – Delivery Frameworks:Roles

Typically test project delivery is assumed by default. It is good practice to detail the roles and let the stake-holders know how a test project is delivered (see **Figures 4 and 5**).

	Close	Central	Outsource	Comment
Core roles				
Delivery Manager	**Y**	**N**	**N**	
Project Manager	**Y**	**N**	**N**	
Test Manager	**Y**	**N**	**N**	
Developer	**N**	**N**	**Y**	
Test Analyst	**Y**	**Y**	**N**	Close in User Acceptance
Test Executor	**N**	**N**	**Y**	Close in User Acceptance
Test Consultant	**Y**	**N**	**N**	Candidate for Central
Issue Manager	**Y**	**N**	**N**	
Test Coordinator for:				
Unit Test	N	N	Y	
Integration Test	N	N	Y	
System Test	Y	Y	Y	
System Integration Test.	Y	N	N	Close to Support
User Acceptance Test	Y	N	N	
Support Acc. Validation Test	Y	N	N	Close to Support
Production Regression Test	Y	Y	N	

Figure 5 - Delivery Frameworks: Role Guidelines

Reporting and Metrics, the Goal/Question/Metric Method

In a structured test method reporting and metrics are essential elements of the process. By default test organisations have some type of test life-cycle (model) typically preparation and execution. Sogeti has since 1996 a very explicit test life-cycle (model) combined with a test management life-cycle (see **Figure 6)**. In TestFrame the test life-cycle (model) is separate from the test management model. In any structured test method reports and metrics are foundation items. Test consulting teams that don't have a structured test method are usually not as efficient or effective in this area. A test manager should be assigned to manage the test project. This should also include a test project manager as well. The test project management should be delivered from the test organisation and not the project organisation.

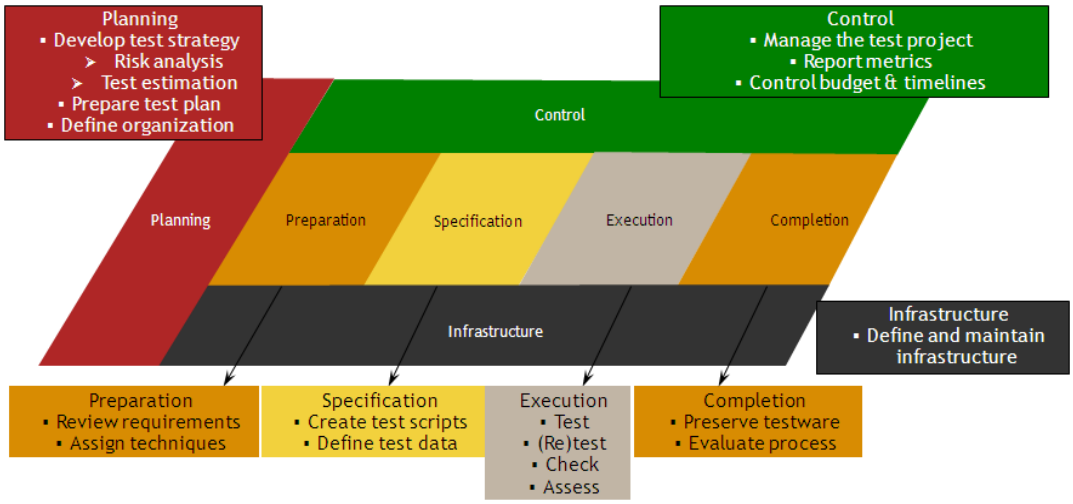


Figure 6 – TMap Test Life-cycle

As for overall reporting along with a weekly status report, preliminary, midterm and end phase reports, along with a dashboard should be delivered to the stake-holders to keep them in consultation as to how the test projects are progressing. So what is important in the consultation with the stake-holders? The test progress and quality of the information system is important. We have to use fact based metrics so that the stake-holders can have a good confidence level in our reporting and advice. If they didn't they would never believe us. Along with this we must provide metrics that are important to the stake-holders. The method we use is known as the Goal/Question/Metric method [viii](GQM). This was developed in Europe by Rini Van Solingen as part of a study on effective software measurement. In many test organisations metrics are pulled from a test management tool and presented to the stake-holders. In structured testing metrics are very focused on the needs of the stake-holder and insight into the quality of the information system. The Fraunhofer Institute in Germany has expanded upon GQM and has produced the next level known as GQM Plus Strategies[ix]. Notice in GQM +Strategies metrics are now tied to the business case (see **Figure 7**). Stake-holders are getting allot of attention these days.

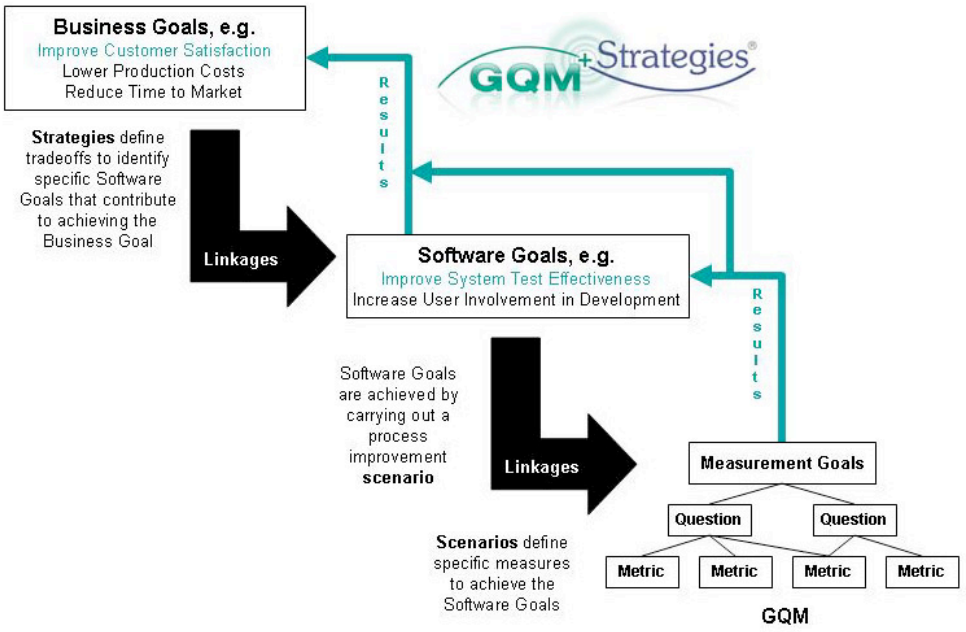
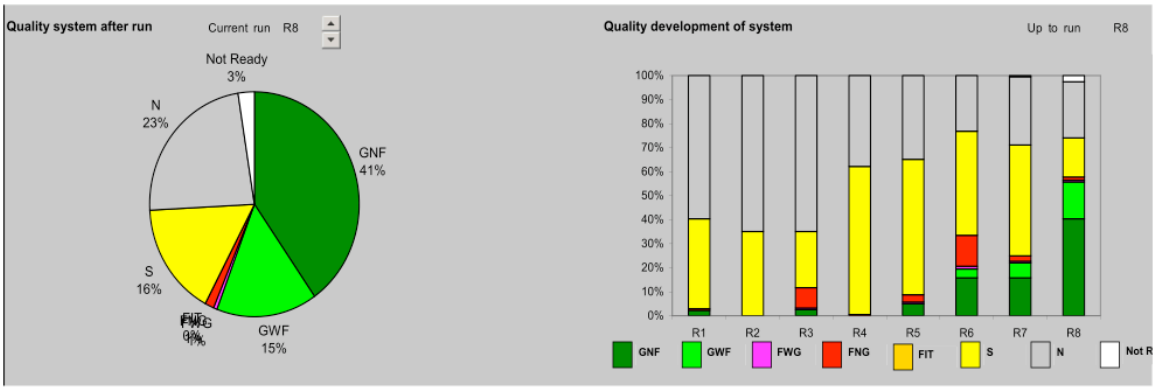


Figure 7 – GQM Plus Strategies

A good example of metrics important to stake-holders are the ones developed by Iris Pinkster and included in the TestFrame templates and Test Control Matrix (Dashboard). These metrics were first introduced at Eurostar in 2002. The **goal** is to make the quality of the information system more visible to the stake-holders. One **question** might be test execution? One **metric** might be hours per test activity. Ultimately these metrics are visible in the dashboard and available to the stake-holders to help drive decisions whether or not to put the information system into production.



GNF : Good, Never Fault	FIT : Fault In Test
GWF : Good, Was Fault	S : Selected, not executed
FWG : Fault, Was Good	N : Not Selected
FNG : Fault, Never Good	Not Ready

Figure 8 – GQM Derived Metrics From TestFrame

5 Measuring Client Satisfaction with Service Level Agreements

I want to get in depth within service level agreements (SLA's) around testing. Before I do that I want to introduce the concept of generic test agreements and give specific examples around testing. Also we need to distinguish between GTA"s and SLA's. All this to prepare the SLA discussion.

Generic Test Agreements (GTA)

GTA's are the agreements between the stake-holders and the test organisation concerning the cooperation in the area of testing during regular maintenance.
The stake-holders and the test organisation both need agreements with regards to testing to prevent misunderstandings concerning the quality of a delivery. However it is not efficient to make new agreements before every contract. That's why the choice is made to make general agreements in the area of testing in the form of a GTA. This is leading for the tests that are performed during every maintenance assignment.

The stake-holders and test organisation both need agreements with regards to testing to prevent misunderstandings concerning the quality of deliveries. However it is not efficient to make new agreements for every separate assignment. Therefore the choice was made to make general agreements in the area of testing in the form of a GTA. This should be leading for the tests that are performed during all maintenance assignments for the test organisation in a certain area (e.g. one or multiple systems). Should it be undesirable or not possible to follow the GTA in specific circumstances, a specific testing agreement will be made for the assignment.

The goal of the GTA is that clarity prevails on the general choices in the testing process between both parties and towards third parties. For the latter, think of business partners of the client, controlling and auditing parties etc.
As long as the GTA is effective, typically this will be re-calibrated and affirmed on a yearly basis.

GTA's typically contain the following information:

1. Test Strategy
2. Organisation
3. Test products
4. Infrastructure

Generic test agreements differ from SLA's in that:

- they are not specific;
- they are loosely based;
- they are developed to prevent misunderstandings;
- they don't use KPI's.

Service Level Agreements

Here we will answer the question of how to measure whether or not we are really serving the stake-holders. The following is a foray into service level agreements within testing projects. This is how we at TESTars measure our testing stake-holder's satisfaction and our own effectiveness. Service level agreements are typically generic in structure. In the case of test projects there are typically basic levels regarding SLA's in place. For example a business need requires resources for a new testing project. The generic test agreement[x] (GTA) between the test and business teams provide for a tester being assigned in a timely manner from a tester pool. SLA's in this sense focus more on the effort than the results. This is where satisfaction of the stake-holders can begin on dangerous footing. There are many factors to take into account here. Does the test organisation have the following:

- a structured test process;
- a structured test management process;
- a centralised test policy developed in conjunction with the test team (see **Figure 9**)

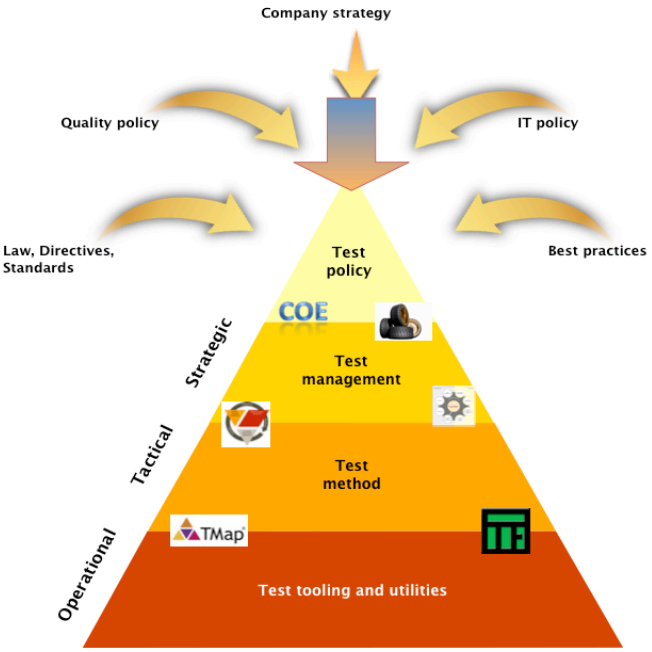


Figure 9 – Testing Pyramid[xi]

There are some inherent principles of testing that are required to follow the SLA's in this testing discussion (Managed Testing 101). For example at TESTars we typically take clients from ad-hoc testing to structured testing via a structured test method. The same is true of test management with BDTM. For centralising a test policy Sogeti follows a Centre of Excellence (COE) model. Essentially we are maturing a clients testing organisation from ad-hoc testing to structured testing to professional testing and ultimately managed testing (if appropriate). To measure the maturity of a testing organisation and transformation we use the Test Maturity Model (TMM)[xii] and or Test Process Improvement model (TPI)[xiii]. Hence the previous mention of effort or time versus results. The stake-holders are obviously interested in both the effort and the results. At TESTars the focus is taking clients from time based testing to results based testing (see **Figure 10**).

In preparation for the actual testing SLA's, let's look at the anatomy of SLA's to help understand them better. For in depth knowledge on this topic I would recommend reading a copy of Trienekens "Specification of Service Level Agreements, Clarifying concepts on the basis of practical research" of which I have referenced.

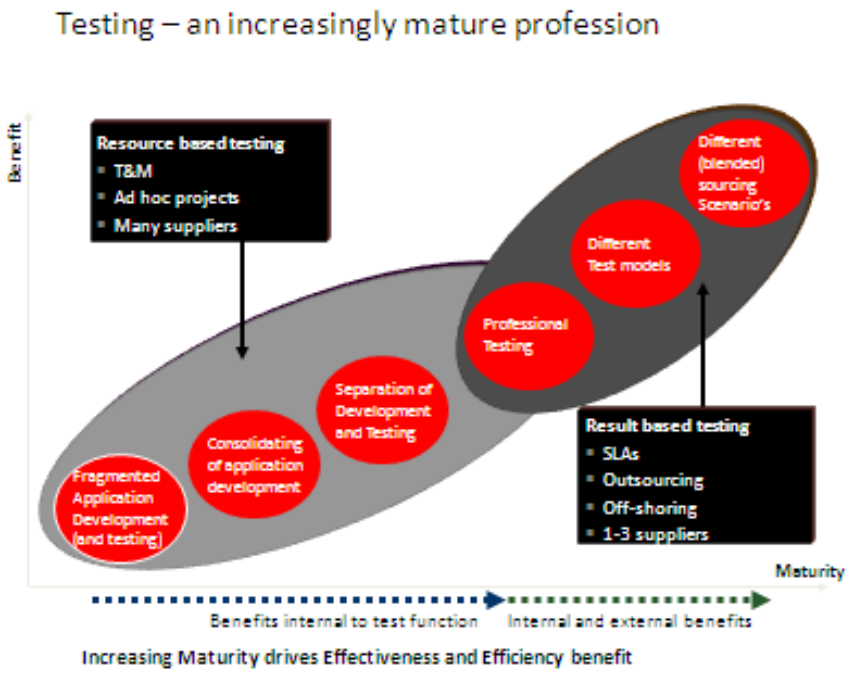


Figure 10 - Testing Maturity

In preparation for the actual testing SLA's, let's look at the anatomy of SLA's to help understand them better. **Figure 11** represents the contents of an SLA with the interrelation of the parties and service. We have the test organisation as the provider, the stake-holders as the customer, and a testing service as the IT object. An example service could be regression testing, in **Figure 12,** I break it down into components, elements and parameters. Again testing organisations are typically providing these services, but not structuring an SLA around them. The SLA is an assumption at that point.

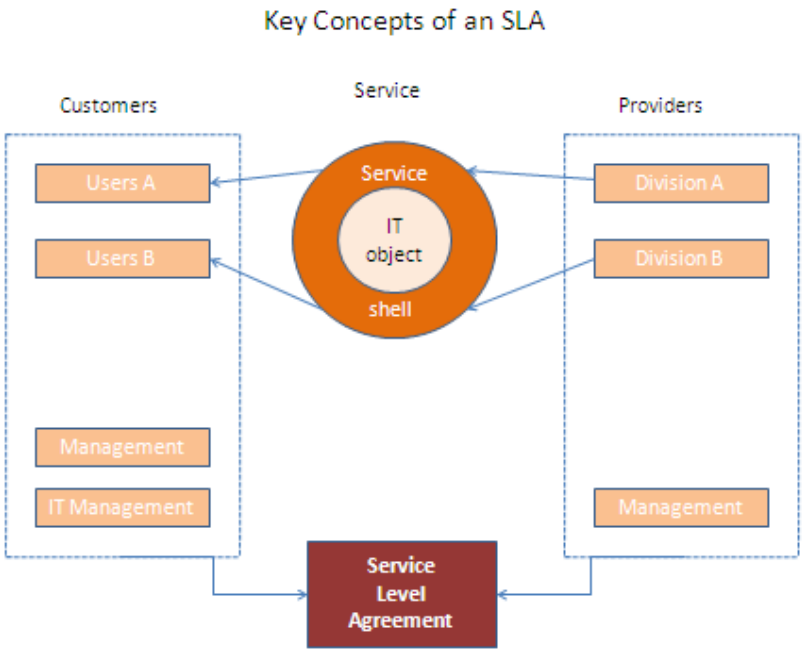


Figure 11 – SLA Pit, Shell, Components and Levels[xiv]

In **Figure 12,** I have included a typical testing service as an example, automated regression test along with the corresponding component, element and parameter.

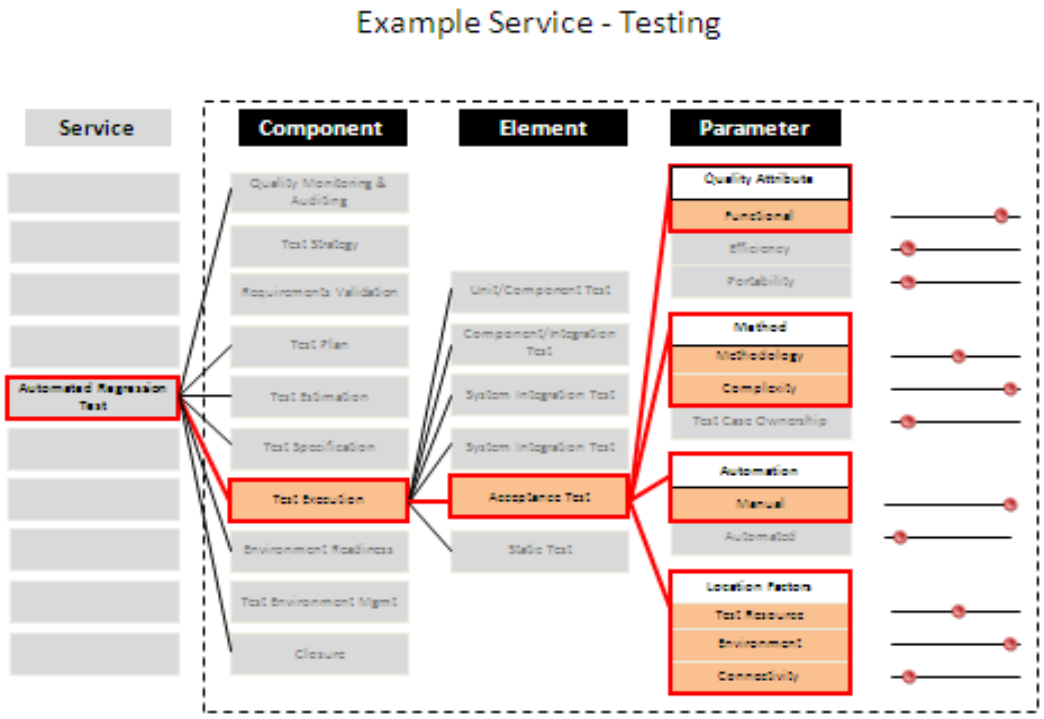


Figure 12 – Testing Service

Here we have a typical SLA as an example.

Critical Service Levels: Performance Category – Resource Delivery

Time to agreed normal Resource Requests

Normal Resource Requests are Resource Requests which the Client Resource Request Owner has not specifically declared to be urgent. This includes Resource Requests which are a result of planning and forecasting activities.

The time for the period between the moment of receipt of the Resource Request by the Provider and the delivery to the Client of the candidate list shall not exceed four (4) Business Days, and the time for the period between the moment of receipt of the Resource Request by the Provider and the start date agreed by the Provider and the Client on which the Provider Resource will commence work for the Client as recorded in the Resource Delivery Agreement shall not exceed nine (9) Business Days.

This service level shall be calculated by adding two measurements (b) and (d), defined below, into one Critical Service Level:

(a) Client will submit a normal resource request Work Order to the Supplier, including the requested start date;

(b) The time between the moment of receipt of the normal Resource Request by the Supplier and the delivery to Client of the candidate list and the candidates' Curriculum Vitae to Client, including available start dates, is expected to not exceed four (4) Business Days;
(c) Client will then select the candidate(s), and the target start date(s) from those valid start dates available, and communicate this in writing to the Provider; and
(d) The time for the period between the moment that the Supplier has received the selected candidate(s) from Client and the Provider's confirmation of the agreed start date of the candidate(s) is expected to not exceed five (5) Business Days. Within this time Provider will also make available at least one candidate (that meets the requirements set out in the Work Order) for a period of 4 hours for the purposes of selection by Client.

The Critical Service Level will be calculated as follows:

(i) A normal Resource Request is compliant when both realised time (b) is within the specified number of four (4) Business Days, and realised time (d) is within the specified number of five (5) Business Days; and

(ii) Provider shall be deemed to have met this Critical Service Level when the total number of compliant normal Resource Requests, expressed as a percentage of the total normal Resource Requests submitted to and completed by the Provider during the Measurement Window, is greater than or equal to the Expected Service Level set forth in a Service Level Matrix.

The following provisions shall apply:

Eff + mos	Expected	Minimum	Window
2	95%	90%	Month

From the moment of receipt of the request (MOR) we have 4 business days to provide candidate information, then available start within 4 business days, and must not exceed 5 business days on the latter. We must provide a qualified candidate as well. To fully meet this SLA our average must be in the 90% or above range.

Key Measurements: Performance Category – Resource Delivery

Percentage of extensions approved by Provider

Extension requests of Client for individual Provider Personnel will automatically be approved by the Provider, unless the Provider has specific reasons to withhold, related to Provider's internal personnel policies, including professional development considerations.

In order to comply with this Key Measurement, the percentage of extensions approved by the Supplier must be greater than or equal to the percentages (expected and minimum) as defined in the Service Levels Matrix.

Eff + mos	Expected	Minimum	Window
2	98%	95%	Month

In these examples there is the service level and then the measurement. These are basic SLA's negotiated between the testing organisation (provider) and the stake-holders (customer). These are basic examples of measuring how we can serve our stake-holders within testing projects. We typically have near 15 defined service levels and 30 key measurements. Realise every provider and client is different, and one approach does not fit all. If we do not meet the SLA's we are not serving our stake-holders, it is that simple.

6 Summary

In Figure 13 I have created a picture of everything discussed in this paper showing the relationships between the components:

BDTM;
test project dashboard;
the delivery framework (resources);
service level agreements;
goal/question/metrics;
stake-holders.

In answering the question how testers can serve stake-holders,
we can:

- help Identify test project and product risk;
- help provide test management directly related to the business case;
- provide status on testing projects;
- provide metrics;
- provide advice;
- provide service level agreements around testing;
- help reduce the cost of testing.

If we only have generic test agreements in place it is hard to measure whether we are truly serving our stake-holders. If we have SLA's around testing set up and we meet the SLA's then we are truly serving our stake-holders.

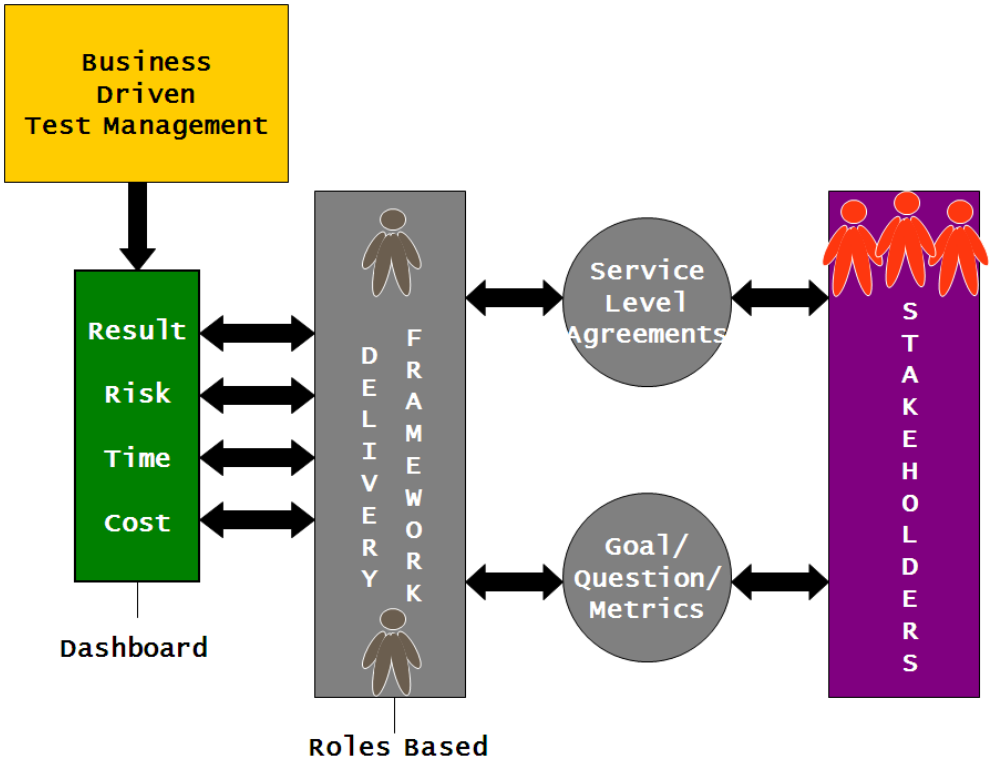


Figure 13 – Relationship Between BDTM, SLA's and Stake-holders

7 Acronyms and Definitions

Action word – an action word is LogicaCMG's version of a keyword within a test automation framework. Action words are business specific test actions developed by a test analyst then implemented by a test automation developer. Action words are used for both manual and automated testing.
BDTM – Sogeti's approach to structured test management.
COE – Centre of Excellence.
GQM – The Goal\Question\Metric Method.
GQM +Strategies – Next generation of the original Goal\Question\Metric Method.
GTA – Generic Test Agreements.
Managed Testing – A term introduced by LogicaCMG where a test consultancy takes full responsibility of a clients testing by providing various testing services matched to service level agreements, global resourcing and may or may not include managed test environments.
RBT – Roles Based Testing.
RRBT – Risk and Requirements Based Testing.
RLCM, Requirements Life-cycle Management – Sogeti's approach to requirements management.
SLA – Service Level Agreement.
Successful Test Management – LogicaCMG's approach to structured test management.
Test Control Matrix – LogicaCMG's test progress dashboard.
TestFrame – LogicaCMG's structured test method and 4th generation test automation framework.
TestGrip – LogicaCMG's approach to defining a test policy.
TMap – Sogeti's Test Management approach for structured testing.
TMM – Test Maturity Model from the Illinois Institute of Technology.
TPI – Sogeti's Test Process Improvement Model.

8 Biographies

(Non-Authors of this document, but important to structured testing, structured test management and some of the pioneering test brains behind addressing stake-holders in testing.)

Iris Pinkster was a Senior Management consultant in Testing at Logica. Iris has pioneered the Logica Test Management Model and Risk and Requirements Based Testing (RRBT) test treatment. Iris has co-authored all the testing books while at LogicaCMG, currently she can be reached at Professional Testing:

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Bob van de Burgt was the Test Competence Manager at LogicaCMG. Bob has pioneered much of the material in the Successful Test Management book, and was a co-inventor of Managed Testing at LogicaCMG. Bob has co-authored the Successful Test Management book while at LogicaCMG, currently he can be reached at Professional Testing:

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Ilene Burnstein (retired) was an associate professor of computer science at the Illinois Institute of Technology. She teaches both undergraduate and graduate courses in software engineering. Her research interests include: software process engineering, software testing techniques and methods, automated program recognition, debugging, and software engineering education. Burnstein has a doctorate from the Illinois Institute of Technology. She can be reached at Illinois Institute of Technology, Computer Science Department.

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Tim Koomen was a Management consultant in Testing at Sogeti. Tim authored the following testing books at Sogeti:

Test Process Improvement, a Step by Step Guide to Structured Testing; TMap Next, for Result Driven Testing.

Tim Koomen focuses on developments in the field of testing, including agile testing, iterative development methods, testing of software packages, data warehousing, etc. Tim is co-author of the book Test Process Improvement, has written various articles, regularly presents training courses, and gives presentations at international

congresses. In 2003, he received the European Testing Excellence Award for his work in the field of TPI®, TMap® and testing in general. Tim can be reached at:

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Erik van Veenendaal is an Executive on the Board at Improve Quality Services.

Erik van Veenendaal has been working as a practitioner and manager in the IT-industry since 1987. After a career in software development, he transferred to the area of software quality. As a test manager and test consultant he has been involved in a great number and variety of projects, has implemented structured testing and carried out test process improvement activities in a large number of organisations. He is the author of numerous papers and a number of books on software quality and testing, including the best-sellers “Testing according to TMap” and ‘The Testing Practitioner”. He is a regular speaker both at national and international testing conferences and a leading international (ISEB accredited) trainer in the field of software testing. At EuroStar’99 and EuroStar’02 he received the best tutorial award for a tutorials on ‘usability testing’ and ‘test planning and strategies’. Erik van Veenendaal is the founder and managing director of Improve Quality Services ltd. He has been a part-time senior lecturer at the Eindhoven University of Technology, faculty of Technology Management for almost 10 years. He is currently the vice-president of the International Software Testing Qualifications Board (ISTQB) and the vice-chair of the TMMi Foundation. Erik also co-authored our LogicaCMG’s Successful Test Management Book.

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