

# THE WHAT AND HOW OF TESTING

## TPI<sup>®</sup>NEXT AND TMAP<sup>®</sup>NEXT RELATED

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The What and How of testing

TPI and TMap Next integrated

Version information

## VERSION INFORMATION

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# 1 INTRODUCTION

## 1.1 World standards

During a large number of years, within different countries and companies testers (engineers, managers, consultants) have applied TMap<sup>®</sup> or TPI<sup>®</sup> (and sometimes both) to their test processes. Both of Sogeti's prominent approaches have been adopted in such a way that they have become leading standards in the world of testing.

Although both acknowledged for their added value and support people may be wondering how the two relate; do they support and strengthen each other, can they exist and be applied separately. This document will answer these questions and guide you through the application of both the methods in a comprehensive way.

## 1.2 The What and How of testing

The difference between the two is that TMap<sup>®</sup> is a *testing method*, an approach for *how* to perform a test process: how to set up a test strategy, how to write test plans, how to design test cases, etc. TMap<sup>®</sup> Next provides a complete and comprehensive set of tools, techniques, guidelines, templates, checklists and detailed descriptions of all parts of the test process.

TPI<sup>®</sup> is an instrument to *measure* the test process and addresses the *what* of testing: are the right activities performed at the right time, how efficient or effective is the process, is it in control and manageable. Furthermore, as a reference model TPI<sup>®</sup> NEXT provides an extensive set of practice based recommendations, possible means to improve the test process and descriptions of the application of the model in several environments.

Where a structured test approach or method is required, or where the test process needs improvement TPI<sup>®</sup> NEXT can be used to assess this situation and put priorities to possible measures. How these measures can be implemented or performed in practice can be read in TMap<sup>®</sup> Next.

## 1.3 Business Driven

In both TPI<sup>®</sup> Next and TMap<sup>®</sup> Next the 'business' plays a key role. In TMap this is described as Business Driven Test Management (BDTM) where the subtitle of TPI Next is: Business Driven Test Process Improvement.

The essential message for testing and test improvement is that we do not have all the time or money in the world to do all the tests or to improve to the highest standards. We have to make choices. These choices depend on the risks (related to a new or adapted product), the results that an organization wants to achieve and the available quantity of time and money. These are the 'business driven' aspects that form the basis for both TPI<sup>®</sup> and TMap<sup>®</sup>. Moreover: both methods do not only use the business driven aspects to make choices but also providing the business with means, tools and techniques to steer and control both processes into a business driven direction.

In TMap<sup>®</sup> Next this results in:

- A risk based test approach, with 'No Risk No Test' as a leading principle;
- A test strategy, based on these risks, to efficiently allocate the test effort;
- Involvement of the client (business) at various moments in the testing programme.

In a test process improvement project with TPI<sup>®</sup>Next this results in:

- Business drivers as the basis for test process improvement;
- Setting priorities to improvement goals and measures;
- Enabling the business to steer and control the improvement process.

A further explanation of the Business Driven aspects can be found in TMap Next, chapter 3.1 Business driven explained. In the TPI Next book this is explained in Chapter 6 Business Driven Test Process Improvement.

## 1.4 Reading

This documents reads as follows:

In the next two chapters we explain the attributes and significance of both methods. This chapter is followed by a practical guideline for the integration of the two.

For a better and detailed understanding of TMap<sup>®</sup> Next and TPI<sup>®</sup> Next we refer to respectively:

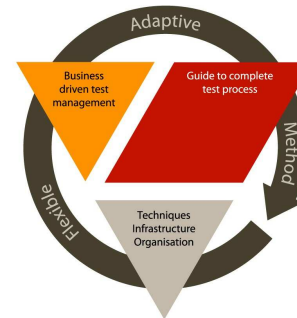
- TMap Next, for result driven testing; Koomen e.a. 2006 Sogeti Netherlands B.V. (UTN Publishers [www.utn.nl](http://www.utn.nl))
- TPI NEXT, business driven test process improvement; 2009 Sogeti Netherlands B.V. (UTN Publishers [www.utn.nl](http://www.utn.nl))

## 2 THE HOW OF TESTING: TMAP® NEXT

Changes in IT, whether it be changes in systems, programs, hardware or software, may affect business continuity and quality. The associated risks need to be managed, as soon as possible and at the lowest cost. The test method "TMap® Next" addresses issues like 'what are the risks when we implement the proposed changes', 'how do we manage and maintain the quality of complex chains of systems and programs' and 'how do we control the effort (time/material) of testing'.

The "TMap® Next" (*Test Management approach*) method

1. TMap® is based on business driven test management
2. TMap® describes a structured test process
3. TMap® offers an complete tool box
4. TMap® is adaptive to any test practice.



consists of four essentials:

(BDTM)

### **BDTM**

Business Driven Test Management enables the customer (the principal stakeholder) to steer the test process in the required direction and to participate in the test approach. BDTM has the following characteristics:

- The total test effort is related to the perceived business risks of the change in systems or programs
- Budget and planning of the test process are related to the defined test strategy
- The principal stakeholder is involved in decision making of testing on several occasions during the test.

### *BDTM activities*

The BDTM test process distinguishes specific moments and activities where the test approach is tuned between the test manager and his customer on the one hand and his team on the other hand:

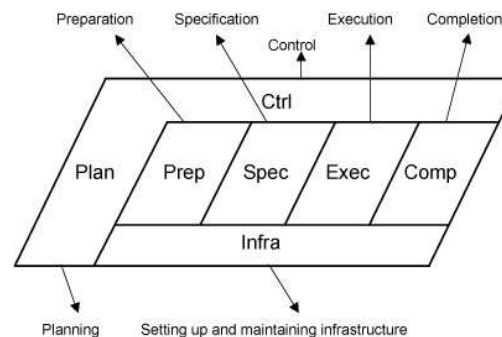
1. The agreement on the test assignment and the identification of test goals
2. The determination of (product) risks and their classification, with the related test goals
3. Addressing the issue of light or severe testing of the combinations of characteristics and (test) objects, depending on the risk analysis
4. High level estimating and planning of the test process

5. Allocating the different test techniques to the combinations (of step 3)
6. Providing sufficient insight and steering options to the customer and other stakeholders regarding the test process and the test object, during the whole test process.

### Structured test process

An important condition for TMap® is that testing is more than just the execution of test cases. In parallel with the development of a system or program preliminary test activities are performed. The advantage of this approach is that the test process itself limits the critical path of development.

The life cycle of the TMap® test process runs as follows:



In the **Planning** phase, the test manager formulates a coherent approach that is supported by the client to adequately execute the test assignment. This is laid down in the test plan. In the **Control** phase the activities in the test plan are executed, monitored, and adjusted if necessary. The Setting up and maintaining **infrastructure** phase aims to provide the required test infrastructure that is used in the various TMap phases and activities. The **Preparation** phase aims to have access to a test basis, agreed with the client of the test, of adequate quality to design the test cases. The tests are specified in the **Specification** phase and executed in the **Execution** phase. This provides insight into the quality of the test object. The test assignment is concluded in the **Completion** phase. This phase offers the opportunity to learn lessons from experiences gained in the project. Furthermore activities are executed to guarantee reuse of products.

All test activities aim at a smoothly running succeeding process. In a well structured test process only the activities of the execution phase are part of the critical path of the project.

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The how of testing: TMap® NEXT

### **Complete tool box**

TMap® supports the structured test process with a complete set of tools. These tools are divided in the following categories:

- Techniques *how* the (test)activities can be executed (for instance: how test cases can be designed)
- Infrastructure *where* and *with what* (tools) will be tested
- Organization *who* does the testing and how is that organized.

### **Adaptive and complete method**

TMap® is a test method that can be applied in each test situation and in combination with any development method. The complete tool box offer the test organization the possibilities to adapt the approach to their specific needs, based on the following principles:

- *Respond* to changes
- *(Re)use* of products and processes
- *Learn* from best practices
- *Try* before use

### 3 THE WHAT OF TESTING: TPI® NEXT

TPI® NEXT is the world's leading approach for **improving** test processes.

The Business Driven TPI model ('the model') is used to analyze the current situation of a test process, showing its relative strengths and weaknesses. The model is also used to discuss and establish specific goals for improving the test process, as well as providing a roadmap for reaching these specific goals.

#### The TPI NEXT model

Each test process can be divided into a combination of coherent aspects called Key areas and the Business Driven TPI model categorizes 16 Key areas. Each **Key area** may have a different level of maturity and the combination of the Key areas defines the maturity of the test process as a whole.

Business Driven TPI has 4 **Maturity levels** which characterize the test maturity: Initial, Controlled, Efficient and Optimizing (detailed information is provided in section 3.3). A particular Maturity level can only be reached if the preceding Maturity level has also been reached. The Initial level is the only Maturity level that does not contain any specific expectations and this Maturity level is automatically present in a test process.

For all other Maturity levels, expectations for the test process are defined through **Checkpoints** (detailed information is provided in section 1.4), which is the measuring unit of the model. A Checkpoint is phrased as a statement that can be confirmed with a 'yes' or a 'no'. Fulfilling a Checkpoint means that the answer for a specific test process is 'yes', with sufficient proof available to substantiate it. A Checkpoint always relates to one Key area and one Maturity level. A Key area is at a certain Maturity level when all its related Checkpoints have been fulfilled.

The test process as a whole is at a certain Maturity level when all Key areas have reached that Maturity level. It is possible to state that the entire process is Controlled if all Key areas have at a very minimum a Maturity level of Controlled. Likewise, the entire process is Efficient or Optimizing if all Key areas have at least this respective Maturity level.

The model enables a stepwise growth, from Initial, Controlled or Efficient levels through to fully Optimizing. Each step is indicated by **Clusters** of Checkpoints. A Cluster is a group of Checkpoints from multiple Key areas that function as one improvement step. Clusters are used for the purpose of increasing the maturity of the test process. Each Cluster is identified by an alphabetic letter that identifies its position in the improvement path, where Cluster 'A' is the first improvement step.

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The What of testing: TPI® Next

The model provides two more elements: the Improvement suggestions and the Enablers. Both elements give additional information to accelerate further development in maturity. **Improvement suggestions** focus on the test process itself. TPI NEXT provides a lot of best practices, based on years of practice, both with using the model but also using TMap as a structured test approach.

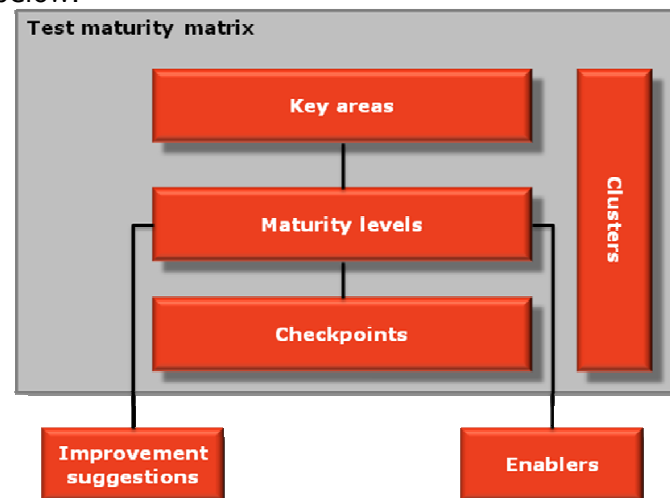
**Enablers** show where the test process and other processes within the software development lifecycle can benefit from each other's best practice. They answer the question: How can testing benefit from other activities and vice versa?

Examples of these are:

- Improving testware management by the use of configuration management.
- Defect management will provide problem management with root cause analysis and support the organisation in detecting weak spots.
- A better quality of the test basis by the use of requirements management.

Organizations that already use a model for software process improvement (like CMMI® or SPICE) are supported by the above mentioned enablers

The structure of the model is indicated below.



The elements Key areas, Maturity levels and Checkpoints are all brought together visually in the **Test maturity matrix**.

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## **Topics**

During the past years, many things have changed in the testing world. Think of topics like (test) outsourcing, Agile testing, multiple test processes, end-to-end testing, etc. These topics are covered by TPI NEXT offering guidelines, tips and tricks of how to deal with specific test types and/or test levels (like evaluation, integration testing).

## 4 WHAT TO IMPROVE AND HOW TO DO THAT

This chapter will detail the checkpoints from TPI®Next and the related chapters and artefacts from TMap®Next. The relationships are indicated as follows:

- Each chapter refers to a Key area
- Each table relates TPI Next checkpoints with TMap chapters or paragraphs, divided into three maturity levels (**C**ontrolled, **E**fficient, **O**ptimized)

### 4.1 Stakeholder commitment

The role (and commitment) of the different stakeholders is not explicitly described in TMap, but is addressed at several activities in the method. The role of the principal stakeholder (TMap terms: the client) is described in Chapter 3.1 Essentials of TMap - Business driven explained. Furthermore the stakeholders play a distinguishing role in the Planning and Control phase of TMap.

Level	Seq.	Checkpoint	TMap Guidelines	TMap Artifacts (at <a href="http://www.tmap.net">www.tmap.net</a> )	Remarks
C	1	The principal stakeholder is defined (not necessarily documented) and known to the testers.	For Master Test plan: 5.2.1 - Establishing the assignment 5.2.12 - Feedback and consolidation of the plan	Checklist 'Understanding the assignment'	In TMap the Principal Stakeholder is addressed as 'client': 'The party giving the assignment to create the (master) test plan and execute the tests. It is important for the test process to acknowledge the person issuing the assignment(..). This can be the project manager, often employed by or appointed on behalf of the user organization.
	2	Budget for test resources is granted by and negotiable with the principal stakeholder.	5.2.5 - Estimating the effort P.160 and 161 - Assignment		The chapter (5.2.5) describes required budgets. By signing the test plan the principal stakeholder grants the resources

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	3	Stakeholders actually deliver the committed resources.			This is a validation check: do stakeholders actually deliver. It is not further addressed in TMap.
	4	The principal stakeholder is responsible for a documented product risk analysis (the input for the test strategy).	5.2.3 Analyzing the product risks	Checklist "PRA interview"	Although the risk assessment is not really a responsibility of the test process (see also TMap Next, page 475, lines 1-10), it is an absolute must for the test strategy. Therefore the PRA is described in detail in Chapter 9.
E	1	All relevant stakeholder are defined (not necessarily documented) and known to the testers.	5.2.2 Understanding the assignment	Checklist 'Understanding the assignment'	In TMap some stakeholders are described as 'acceptants'
	2	Stakeholders actively acquire information on the quality of both the test process and the test object.	3.1 Business driven explained 6.8.1 Evaluating the test process	Checklist 'Evaluation of the test process'	The chapter describes the vital communication loops between stakeholders and test process (see 'The steps in the business driven test management approach, p.58).
	3	The stakeholders proactively take action on aspects that affect the test process. This includes changes in the delivery sequence of the test object and changes in the project scope.	3.4.1 Respond to changes 5.3 Control phase of the total test process		TMap states that "(the test manager) also ensures that he is well informed of the developments beyond testing, such as delays in development ..."
O	1	Line management acknowledges that test process improvement comes with the need for increased learning time for which resources are provided.			Not explicitly described in TMap Next
	2	Stakeholders are willing to adapt their way of working to suit the test process. This includes the software development and requirements management.			Not explicitly described in TMap Next

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	3	An adapted way of working by the stakeholder to suit demands of the test process is jointly evaluated by the test organization and the stakeholder.			Not explicitly described in TMap Next

## 4.2 Degree of involvement

Aiming at keeping the test activities as short as possible on the critical path of a project and detecting the most critical defects as early as possible, all of Tamps activities are geared towards early and tight involvement of testing in the SDLC. This is described in great lines in Chapter 3.2 Structured test process.

Level	Seq.	Checkpoint	TMap Guidelines	TMap Artifacts (at <a href="http://www.tmap.net">www.tmap.net</a> )	Remarks
C	1	The test assignment, scope and approach are negotiated early with the principal stakeholder as one of the first test activities.	5.2.1 and 6.2.1 Establishing the assignment	Checklist 'Understanding the assignment' Checklist "Preconditions and assumptions"	
	2	Test activities are started early, timely before test execution, with the goal of keeping the test activities of the project's critical path.	P.93 - Tips - (too)early involvement P.153 - Relationship between TMap test life cycle and system development life cycle		
	3	A tester is involved in project planning: dependencies between the test process and other processes are taken into account.	5.2.6 Determining the planning (Method of operation/Feedback)		Note that TMap does not describe this responsibility towards project planning explicitly.
	4	A tester is involved in the analysis and mitigation of overall project risks.	5.2.11 Determining test process risks	Checklist "Test process risks"	By determining and communicating the projects risks (and its mitigation measure) for the test process, the tester contributes to the mitigation of project risks.
E	1	Testers contribute to impact and risk analysis of change requests and changes to the test basis.	6.5.3 Assessing het test basis	~ Checklist "Test design techniques" ~ Evaluation techniques (Chapter 15)	The Checklist helps to compose a checklist for assessing the test basis

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	2	Testers contribute to the impact analysis of defects.	P.562 - Minimum fields in a defect report 12.4 (Defects) Procedure		The page refers to the importance of assessing and prioritizing the defects.
	3	Testers are actively involved in optimizing the test basis (more than a testability review), in which the object under test is described.	15.1 and 15.2 Evaluation	Matrix "Evaluation techniques selection" Template Testability Review Report	The test process needs to ensure and support the cycle of review - defect reporting - rework - evaluate the test basis.
O	1	The test team is involved in the evaluation of the project. The lessons learned from the test process are valued and used for (the set up of) future projects.	6.8.1 Evaluating the test process P.324 - Tip - Evaluations as leverage for change	Checklist "Evaluation of the test process"	
	2	The test team has an undisputed part in all relevant development activities, being accepted and valued.	P.325 - Example - Testers as sounding board		

### 4.3 Test strategy

TMap Chapters 5.2.4 and 6.2.5 describe Determining the test strategy for resp. the Master test planning and the test levels. Because a sound product risk analysis (PRA) is the basis for all testing (No Risk No Test) the PRA is described in detail in Chapter 9.

Level	Seq.	Checkpoint	TMap Guidelines	TMap Artifacts (at <a href="http://www.tmap.net">www.tmap.net</a> )	Remarks
C	1	The principal stakeholder agrees with the documented test strategy.	P.133 - 2) Feedback on the master test plan		
	2	The test strategy is based on a product risk analysis.	5.2.3 Analyzing the product risks 5.2.4 Determining the test strategy	Checklist "PRA interview" Checklist "Risk factors per quality characteristic"	TPI NEXT states that a PRA is a responsibility outside the test process, although the PRA is described in detail in TMap.
	3	There is a differentiation in test levels, test types, test coverage and test depth, depending on the analyzed risks.	5.2.4 Determining the test strategy 10 Quality characteristics and test types	Overview "Applied test types"	The stepwise determination of the test strategy is described in the chapter

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	4	For retests and regression testing a simple strategy determination takes place.	P.177 - In more detail - Regression test		
E	1	All relevant stakeholders agree with the defined (and documented) test strategy.	5.2.12 Feedback and consolidation of the plan		
	2	The overlap or gaps in test coverage between test levels or test types are well considered.	5.2.4 Determining the test strategy		
	3	The test strategy includes adequate test design techniques.	6.2.8 Allocating test units and test techniques	Table "Quality characteristics/test design techniques"	Especially the table on page 193 is useful
O	1	The process of creating the test strategy is evaluated regularly and, where necessary, adapted for future use.	6.8.1 Evaluating the test process P.324 - Tip - Evaluations as leverage for change		
	2	The test strategy itself is evaluated against metrics on incidents that occur in production.			

### 4.4 Test organization

The organization of the test process is addressed in several chapter of TMap. The roles, tasks and responsibilities are described in 8.6 Test professionals and 16 Test roles. The different structures of an organization can be found in 8.3 Permanent test organization.

Level	Seq.	Checkpoint	TMap Guidelines	TMap Artifacts (at <a href="http://www.tmap.net">www.tmap.net</a> )	Remarks
C	1	People involved know where to find the persons (or department) responsible for test services.	8.6.2 (Test professionals) Points of concern P.384 - Publicizing the test services		

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	2	There is a structure of control and accountability within the test organization.	5.2.8 Defining the organization 8.6.2 Points of concern		In Tmap het emphasis lies with the test functions (tasks and responsibilities) enabling the required structure
	3	Test tasks and responsibilities are defined (and documented) and are assigned to a person or organizational unit.	8.6.5 Positions <i>and</i> 16 Test roles (for the descriptions) 5.2.8 Defining the organization (for the documentation in the test plan)		
	4	The products and services of the test organization are clear to its clients.	P. 384 Publicizing the test services 8.3.4 Supplying test services		
E	1	Different persons or departments that provide test services reconcile the organizing of their test work.	????		
	2	The test organization provides the agreed test resources and services to the projects.	P.381 - Offering service levels		
	3	A well considered choice has been made as where and how to position the test organization.	P.391 - Organization P.397 - Possible organizational structure		
	4	The test policy is followed.			
O	1	The products and services of the test organization are regularly evaluated; new services are added when they are cost-effective.	P.404 - Activity 5 Trial P.404 - In more detail- Pitfalls		
	2	The test organization is held accountable for success and failure of test assignments.	P.381 - Offering service levels		
	3	The test organization performance is regularly compared with external suppliers or similar test organizations.	????		

### 4.5 Communication

The major part of this Key area is described in the activities of the Planning phase (5.2 and 6.2) as an aspect that needs to be properly planned and well organized.

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Level	Seq.	Checkpoint	TMap Guidelines	TMap Artifacts (at <a href="http://www.tmap.net">www.tmap.net</a> )	Remarks
C	1	Every team member is aware of decisions being made and of internal progress.	P.205 - 6) Establishing communication and reporting lines		
	2	The test team actively gathers relevant information from stakeholders.	5.2.2 Understanding the assignment (MTP)+E15 6.2.2 Understanding the assignment (DTP)		
	3	It is possible to trace back points of action, agreements and decisions of the test team.	P.206 Example of a fixed agenda for a test team meeting		
	4	The test team deliberates with stakeholders about progress, product quality and risks and signals proactively potential delays as well.	P.212 1) Defining test process management		
E	1	The test team identifies which information needs to be shared with which stakeholder.	6.2.2 Understanding the assignment	Checklist "Understanding the assignment"	
	2	The test team participates in relevant meetings with other stakeholders.	6.2.2 Understanding the assignment	Checklist "Understanding the assignment"	
	3	The test team has the different (communication) means necessary to its disposal to communicate with its stakeholders using an appropriate form.	P.205 - 6) Establishing communication and reporting lines		
O	1	Best practices and lessons learned regarding communication and its efficiency are evaluated during and at the end of a test project for future purposes.	6.8.1 Evaluation of the test process	Checklist "Evaluation of the test process"	
	2	The organization investigates the use of new means of communication and defines policies.			

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## 4.6 Reporting

TMap Chapters 5.3.3 Reporting (for Master test planning) and 6.3.3 Reporting B14(for test levels) relate to the various aspects of Reporting.

Level	Seq.	Checkpoint	TMap Guidelines	TMap Artifacts (at <a href="http://www.tmap.net">www.tmap.net</a> )	Remarks
C	1	The reporting contains aspects of time and/or costs, results and risks.	P.240 and 241 - 2) Product risk and strategy adjustment (risks) <i>and</i> 3) Progress of the test process	"Example progress report" Template Progress Report	
	2	The reporting frequency and content matches the basic demands of stakeholders for the decision making process.	6.3.3 Reporting - Method of operation		
	3	Reporting is done in writing.		Template Final Test Report Template Intake Report Template Release Advice	
E	1	Fulfilling the reporting demands of stakeholders, needed for an efficient decision making process, is balanced against the effort for providing it.	????	"Example progress report"	
	2	The reporting contains trends and recommendations concerning test process progress and project risks.	P.240 and 241 - 2) Product risk and strategy adjustment (risks) <i>and</i> 3) Progress of the test process P.245 b) Risk report	Checklist "Test process evaluation"	
	3	The reporting contains trends and recommendations concerning test goals and product risks.	P.245 - c) Release advice	Checklist "Test process evaluation"	
O	1	Reporting provides data and/or measurements that can be used for current and future improvements of the test process and the software development lifecycle.	P.242 - 6. Quality of the test process	Checklist "Test process evaluation"	
	2	The data and/or measurements for software process improvement are handed over to a line organization at			

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		the test project closure.			

## 4.7 Test process management

Setting up, planning, monitoring, controlling and steering the test process is described in the sections Planning phase (5.2 and 6.2) and Control phase (5.3 and 6.3).

Level	Seq.	Checkpoint	TMap Guidelines	TMap Artifacts (at <a href="http://www.tmap.net">www.tmap.net</a> )	Remarks
C	1	At the start of the test project a test plan is created. The test plan includes at least the test assignment, the test scope, the test planning, the roles and responsibilities.	Ch.5 - Master Test Plan, managing the total test process. 5.2.1 - Establishing the assignment 5.2.2 - Understanding the assignment 5.2.6 - Determining the planning 5.2.8 - Defining the organization	Checklist "Test Process Risks" Template Master Test Plan Template Test Plan System and Acceptance Tests Template Test Plan Development tests	Ch.6 deals with the test plans for detailed tests and test types.
	2	The test plan is agreed with the principal stakeholder.	5.2.12 - Feedback and consolidation of the plan		
	3	Each test activity is monitored and when necessary adjustments are initiated.	6.3.2 Monitoring		
	4	The test plan is agreed with the relevant stakeholders.	6.2.14 Feedback and consolidation of the plan		
E	1	(Anticipated) Deviations of the test plan are discussed with the principal stakeholder and other relevant stakeholders.	6.3.2 Monitoring		
	2	Adjustments to the test plan are documented.	6.3.4 Adjusting		
	3	The test lead has a delegated mandate for the (re-)allocation of resources.	????		

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O	1	Test process management is regularly evaluated, internally (by the test organization) and with stakeholders.	6.8.1 Evaluating the test process	Checklist "Test process evaluation"	
	2	Lessons learned from earlier test projects are used for improving test process management.			

#### 4.8 Estimating & Planning

Estimation techniques can be found in Chapter 11 Estimation techniques. The planning aspects of the test process are described in the sections about Planning and Control (Chapters 5 and 6).

Level	Seq.	Checkpoint	TMap Guidelines	TMap Artifacts (at <a href="http://www.tmap.net">www.tmap.net</a> )	Remarks
C	1	For test effort estimation, simple techniques are used such as ratios.	11.2 Estimation based on ratios	Tool "Estimating the test effort"	
	2	For each test activity there is an indication of the period in which it runs, the resources required and the products to be delivered. Activities to be identified are: test planning and management, defining test cases and executing test cases.	6.2.7 Determining the planning		
	3	The dependencies between test phases or test activities are plotted in a test planning. A certain overlap of test phases and test activities is allowed.	6.1 - TMap life cycle model 6.2.7 Determining the planning		
	4	Test estimations and test planning are discussed with the principal stakeholder.	P.186 Feedback		
E	1	To be as accurate as possible, at least two estimating techniques are used.	11 Estimation techniques	Tool "Test Point Analysis"	

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	2	The test phases and/or test activities are estimated and planned, using formal techniques.	11 Estimation techniques		
	3	Metrics are used to support the estimating and planning activities.	13.4 Practical starting set of metrics		
	4	The test planning includes a testability review of the test basis and the evaluation of the test project.	6.2.3 Determining the test basis 6.5.3 Assessing the test basis	Checklist for assessing the test basis 15 Evaluation techniques	
O	1	The test planning includes the conservation of testware for future reuse.	6.8.2 Preserving the testware		
	2	A set of estimation techniques and principles are maintained at an organizational level.	11.1 Estimating		
	3	Key figures/data for the defined estimation techniques are provided at an organizational level.	11 Estimation techniques		

## 4.9 Metrics

The how, what and why of collecting, analyzing and management of (statistical) information is addressed in chapter 12 Metrics.

Level	Seq.	Checkpoint	TMap Guidelines	TMap Artifacts (at <a href="http://www.tmap.net">www.tmap.net</a> )	Remarks
C	1	In the test process metrics are defined and used to estimate and control the test project.	13 Metrics 13.3 Hints and tips 13.4 Practical starting set of metrics		
	2	The necessary input for the metrics is recorded uniformly and the defined metrics are systematically stored.	13.3 Hints and tips		
	3	The input (data) for metrics is provably accurate.	13 Metrics		

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E	1	The required effort to collect, analyze and value the necessary data is measured against the benefits.	13.2 GQM method in six steps		
	2	Collecting metrics does not conflict with the progress and quality of the test process.			
	3	In the test process metrics are defined and used to measure the efficiency of the test process.	13.2 GQM method in six steps 13.5 Metrics list		
	4	Conclusions coming from analyzed metrics are discussed with stakeholders and are acted upon.	6.3 Control phase - Monitoring - Reporting 6.8.1 Evaluating the test process		
O	1	The way metrics contribute to the information need is monitored.	6.3 Control phase - Monitoring		
	2	Changes in information need lead to new or optimization of metrics.	????		

## 4.10 Defect management

Chapter 12 Defects management describes the different aspects of (handling) defects.

Level	Seq.	Checkpoint	TMap Guidelines	TMap Artifacts (at <a href="http://www.tmap.net">www.tmap.net</a> )	Remarks
C	1	The defect lifecycle is defined (including a retest) and applied.	12.4 (Defects management) Procedure		
	2	The following items are recorded for each defect: unique ID, related test case ID (if applicable), person reporting the defect, date, severity category, description (the actions to reproduce the defect, expected and observed result) and defect status.	P.562 Minimum fields in a defect report		
	3	For further handling of defects the responsibilities are defined.	12.4 (Defects management) Procedure		

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	4	All those involved in assessing and solving defects have access to the relevant defect management tool.			
E	1	The defect management tool enforces the authorization structure for status transitions of defects.	12.4 (Defects management) Procedure		
	2	All persons involved in logging and/or tracking defects use the same defect management tool or separate defect management tools with a seamless connection.	P.432 Defect management tool		
	3	The defect administration lends itself for extensive reporting possibilities, which means that reports can be selected and sorted in different ways.	6.3.3 Reporting - Status of the test object -		
	4	Trends are identified. For this, more information is recorded about a defect, the subsystem, priority, program and version, test basis and version, root cause, all status transitions and problem solver.	6.3.3 Reporting - Trends and recommendations		
O	1	A set of guidelines for defect management is provided by the line organization or project management, and used for each test project.	12.4 (Defects management) Procedure		
	2	Defect management is the responsibility of the line or project organization, where the test process provides the necessary data.	P.561 In more detail		
	3	Defects are analyzed for common properties and recommendations are made to avoid future defects.			

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#### 4.11 Testware management

The handling of testware (products of the test process, both input and output) is described with the activity in the planning phase Organizing the management (5.2.10 and 6.2.12).

Level	Seq.	Checkpoint	TMap Guidelines	TMap Artifacts (at <a href="http://www.tmap.net">www.tmap.net</a> )	Remarks
C	1	The test basis, the test object and all testware are identified by name and version.	P.216 3) Defining test product management		
	2	Each test case is related to a test basis document in a transparent way.	P.217 In more detail - Traceability		
	3	The test team has access to all items under testware management.			
	4	The procedure by which testware, the test basis and the test object are managed is explicitly laid down and known to the test team.	P.216 Defining test product management		
E	1	The test basis, the test object and all testware are referenced by name and version.	P.216 Defining test product management		
	2	Traceability is provided between test cases and the requirements.	P.217 In more detail - Traceability		
	3	Testware management is supported by a logical storage structure, roles and an authorization structure.	P.726 Testware administrator		
O	1	It is agreed at test project start and rethought during the test project which testware will be conserved at the closure of the test project.	6.2.12 Organizing the management P.161 Additionally, the test ..... 6.3.2 Monitoring		
	2	Guidelines for conserving testware for reuse are available and the reuse of testware is measured.	P.216 3) Defining test product management		

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	3	At the end of the project, the testware that will be handed over to maintenance is easily separable from the testware that is not going to be maintained.	P.217 In more detail - Traceability		

## 4.12 Methodology practice

TMap in itself is a methodology and guideline for testing and can be used as such. How the methodology can be practiced and applied is described as well in detail.

Level	Seq.	Checkpoint	TMap Guidelines	TMap Artifacts (at <a href="http://www.tmap.net">www.tmap.net</a> )	Remarks
C	1	The test process follows a documented test method: the test method describes a set of test activities, the test products delivered by the test project and additional requirements on the way of working.	6 Acceptance and system tests	Template Generic Test Agreements	
	2	The test method fits the development method applied by the project.	6.1 Introduction TMap life cycle		
	3	The test projects consider the implemented test method to be of practical use.	6.8.1 Evaluating the test process	Checklist "Test process evaluation"	
E	1	The test method describes for all test activities the goal, the responsible role, any techniques to be used and preconditions.	6 Acceptance and system tests		
	2	A complete and comprehensive set of templates is provided as part of the test method.			
	3	Mandatory, conditional and optional elements of the test method are indicated.			

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	4	The mandatory and conditional elements are put into practice.			
O	1	Test teams structurally provide feedback regarding the test method.	6.2.14 Feedback and consolidation of the plan 6.3.3 Reporting		
	2	The implemented test method is continuously enhanced and improved.	6.8.1 Evaluating the test process		

### 4.13 Tester professionalism

The tasks, responsibilities, skills, competences are described as a supporting process in chapter 8.6 Test professionals. The supporting 'roles' for testing are described in chapter 16 Test roles.

Level	Seq.	Checkpoint	TMap Guidelines	TMap Artifacts (at <a href="http://www.tmap.net">www.tmap.net</a> )	Remarks
C	1	Testers have received specific test training and/or have sufficient experience in the field of structured testing.	P.454 Training options 8.6.6 Training 8.6.5 Positions - required knowledge and competences		
	2	Testers are familiar with the adopted test method and they apply it.	8.6.5 Positions - required knowledge and competences		
	3	All required expertise - whether industry, business or technical - is available to the test team.			
	4	Testers are regularly evaluated on specific testing skills as well as general IT abilities in an employee performance appraisal.	P.454 Reviews		
E	1	Testers are certified in testing (such as TMap Next or ISTQB).	P.468 In more detail		
	2	Testers can explain the rationale behind chosen techniques that have been applied.	8.6.5 Positions - required knowledge and competences		

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	3	Test personnel enjoy their job and have a good relationship with other skill groups in the project.	8.6.3 Characteristics		
	4	Test tasks are defined, allocated and executed in line with expectations.	8.6.5 Positions - Possible tasks		
O	1	Testers actively participate in Special Interest Groups, attend test seminars or read test literature to keep their skills up to date.			
	2	Test functions are part of the organization's Human Resource Management and personal career development.	8.6.4 Career path		
	3	Testers strive towards accountability and responsibility for their own work and continuous improvement of their work process.	P.454 Reviews		

#### 4.14 Test case design

Deriving test cases from the test basis requires specific techniques. They are described in detail in chapter 14 Test design techniques.

Level	Seq.	Checkpoint	TMap Guidelines	TMap Artifacts (at <a href="http://www.tmap.net">www.tmap.net</a> )	Remarks
C	1	The test cases are recorded on a logical level.	14.2 Essential test design concepts	Template Test Scenario Template Test Script	
	2	The test cases consist of a description of: a) initial situation, b) change process = test actions to be performed, c) predicted result.	14.2.1 Test situation, test case and test script		
	3	The test cases provide insight into which part of the test basis, describing a specific system behavior, is subject to the test.	14.2.1 Test situation, test case and test script		

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E	1	The test cases are understandable to and maintainable by peers within the test organization.			
	2	The coverage level of the test basis - as reached by the test cases - is known.	14.2.2 Coverage, coverage type and coverage ratio		
	3	Formal test design techniques are used to design test cases.	14.4 A basic set of test design techniques	Checklist "Test Design Techniques"	
	4	Checklists are used for the testing of quality characteristics for which no test cases can be designed.	14.3.10 Checklist P.594 How are techniques related to quality characteristics/test types?		
O	1	Defects that occur in the next phase (the next test level or production) are being analyzed, leading to improvements in the accuracy and effectiveness of test cases.	12.2 Finding a defect		
	2	Test cases are checked and evaluated independently on validity and maintainability.	14.3 Coverage types and basic techniques		
	3	The test design techniques are evaluated and adjusted for further re-use.	P.637 Creating new test design techniques		

### 4.15 Test tools

Different tools for different purposes are used in the test process. Chapter 8.5 describes all aspects. Furthermore, a special part of the TPI NEXT book is dedicated to the maturity of test tools (See TPI NEXT, Appendix A Maturity of the use of test tools).

Level	Seq.	Checkpoint	TMap Guidelines	TMap Artifacts (at <a href="http://www.tmap.net">www.tmap.net</a> )	Remarks
C	1	The test tools needed to execute specific test activities and to reach the test goals are available to and used by the test team.	8.5.1 Introduction (to test tools) 8.5.2 Test tools explained 8.5.3 Types of test tools	Checklist "Intake Test Tools" Overview "Tools per TMap activity"	
	2	Knowledge about the test tools in use is available.	P.463 Test tool expert		

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	3	Everyone involved, including the purchasing entity, considers the specific test tool used to be beneficial.	8.5.4 Advantages of using test tools		
E	1	Test tools currently used have been selected for testing faster, cheaper, better or making the test process better manageable.	8.5.5 Implementing test tools with a tool policy 8.5.3 Types of test tools		
	2	The test tools are at the testers disposal at any required moment.	8.5.5 Implementing test tools with a tool policy		
	3	A business case has been created for each introduced test tool within the test process.	8.5.5 Implementing test tools with a tool policy		
	4	The use of these test tools is integrated in the test process.	8.5.5 Implementing test tools with a tool policy		
O	1	The tool policy is created and kept synchronized with the existing test policy.	8.5.5 Implementing test tools with a tool policy		
	2	The expertise, best practices and test tools products are collected and published for future projects.	8.5.8 Operation phase		
	3	Test tools are regularly evaluated on reaching the goals that have been set in the business case for implementing the test tool and the test tool policy.	8.5.8 Operation phase		

### 4.16 Test environment

Different phases of the test process require specific infrastructure. These facilities and resources (including tools) are described in chapter 6.4 Setting up and maintaining infrastructure phase. Furthermore the different aspects of test environments (composition, different aims) are addressed in supporting processes 8.4 Test environments.

Level	Seq.	Checkpoint	TMap Guidelines	TMap Artifacts (at <a href="http://www.tmap.net">www.tmap.net</a> )	Remarks
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C	1	Test environment requirements are documented.	8.4.3 Setting up test environments 8.4.5 DTAP model 8.4.6 Processes in test environments			
	2	Working agreements are made with the parties supplying the test environment. These agreements contain tasks and responsibilities.	P.413 Owners and administrators of the environment types	Checklist "Intake Test Environment"		
	3	The test environment is available to the test team during the agreed time.	8.4.3 Setting up test environments		Checklist "Intake Workplace"	
	4	The test manager is timely informed whenever a change to the test environment is planned.	8.4.6 Processes in test environments		Checklist "Intake Workplace"	
E	1	Acceptance of the test environment takes place using a checklist created in advance.	8.4.3 Setting up test environments			
	2	A logical or functional design of the test environment is put together. It addresses applications, systems and their connections, and the use of stubs and drivers (mock-ups).	8.4.3 Setting up test environments			
	3	Supplying parties deliver a technical design of the test environment that is formally accepted by the test manager or the test environment specialist.	P.411 The cube notation for test environments			
	4	Agreements with supplying parties have a Service Level Agreement nature.	8.4.9 Setting up and maintaining test environments as a service			
O	1	The ownership of test environments lies with a distinct department.	8.4.9 Setting up and maintaining test environments as a service			
	2	Usage of test environments is laid down in a standard contract.	8.4.9 Setting up and maintaining test environments as a service			
	3	Services in scope and out of scope with regard to test environments are laid down in a Service Catalogue.	8.4.9 Setting up and maintaining test environments as a service			
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