

# **Certified Tester**

## **Advanced Level Overview**

Version 2012

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International Software Testing Qualifications Board

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## Revision History

Version	Date	Remarks
0.1	October 4 <sup>th</sup> 2011	Initial version:
0.2	October 5 <sup>th</sup> 2011	TA edits from Judy McKay
0.3	October 19 <sup>th</sup> 2011	WG review comments
0.4	14DEC2011	Incorporation of NB review comments
0.5	16DEC 2011	Incorporation of review comments in San Francisco
Alpha	17FEB 2012	Updates for Alpha release
Beta	6 APR 2012	Incorporation of comments from NBs received on time from Alpha release.
Beta	8 June 2012	Beta release for NB review after copy edit
Release Candidate	28JULY2012	Addition of explanation regarding standards and ISTQB web site additions
GA	19OCT2012	General availability release

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## Acknowledgements

This document was produced by a core team from the International Software Testing Qualifications Board Advanced Level Working Group - Graham Bath, Mike Smith, Rex Black, Judy McKay; 2010-2012.

The core team thanks the review team and all National Boards for their suggestions and input.

At the time the Advanced Level Syllabus was completed the Advanced Level Working Group had the following membership (alphabetical order):

Graham Bath, Rex Black, Maria Clara Choucair, Debra Friedenberg, Bernard Homès (Vice Chair), Paul Jorgensen, Judy McKay, Jamie Mitchell, Thomas Mueller, Klaus Olsen, Kenji Onishi, Meile Posthuma, Eric Riou du Cosquer, Jan Sabak, Hans Schaefer, Mike Smith (Chair), Geoff Thompson, Erik van Veenendaal, Tsuyoshi Yumoto.

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This document was formally approved for release by the General Assembly of ISTQB® on October 19th, 2012.

## 1. Introduction to the Advanced Level

This overview document is intended for anyone with an interest in the ISTQB Advanced Level who wants a high-level introduction to its leading principles and an overview of the individual Advanced Level syllabi.

The Advanced Level certifications will be examined with three major role descriptions in mind, each representing basic responsibilities and expectations within an organization. In any organization, responsibilities and associated tasks may be split between different individuals or covered by a single individual.

The following Advanced syllabi are defined:

- Test Manager
- Test Analyst
- Technical Test Analyst

In this document each Advanced Level syllabus is summarized and associated Business Outcomes are stated. These Business Outcomes provide a specific statement of what can be expected from a person who achieves Advanced Level Certification in a particular subject area, (e.g., an Advanced Test Manager), and will outline the benefits for companies who are considering the development of specific testing skills at this level.

For stakeholders who are already familiar with or use the 2007 version of the Advanced Level Syllabus, a summary of principal changes is provided in the appendix.

### 1.1 Career Paths for Testers

Building on the Foundation Level, the Advanced Level supports the definition of career paths for professional testers. A person with the Advanced Level Certificate has extended the broad understanding of testing acquired at the Foundation Level to enable the role of Test Manager or Test Analyst to be performed. Test Analyst skills may be further extended into the role of Technical Test Analyst.

The Advanced Level establishes a platform from which further skills and knowledge may be acquired at the Expert Level. After achieving experience as a Test Manager, for example, a person may choose to develop their testing career further by acquiring Expert Level certifications in the subjects of test management and improving the test process.

People possessing an ISTQB Advanced Level Certificate may use the Certified Tester Advanced Level acronyms CTAL-TM, CTAL-TA, and CTAL-TTA, according to the subject for which they are certified. If all three certifications are acquired, the CTAL-Full acronym may be used.

### 1.2 Intended Audience

The Advanced Level qualification is aimed at people who have achieved an advanced point in their careers in software testing. This includes people in roles such as Testers, Test Analysts, Test Engineers, Test Consultants, Test Managers, User Acceptance Testers and Software Developers.

This Advanced Level qualification is also appropriate for anyone who wants a deeper understanding of software testing, such as Project Managers, Quality Managers, Software Development Managers, Business Analysts, IT Directors and Management Consultants.

## 1.3 Learning Objectives

In general the Foundation Level syllabus and all parts of the specific Advanced Level syllabus are examinable at a K1 level, i.e. the candidate will recognize, remember and recall terms and concepts stated in the Foundation and the specific Advanced Level syllabus.

The relevant Learning Objectives at K2, K3 and K4 levels are provided at the beginning of each chapter within each particular Advanced Level Syllabus.

## 1.4 Entry Requirements

To be able to obtain an Advanced Level certification, candidates must hold the Foundation Certificate and satisfy the board which examines them that they have sufficient practical experience to be considered Advanced Level qualified. Refer to the relevant Exam Board and/or National Board to check the specific criteria used to evaluate practical experience.

## 1.5 Structure and Course Duration

The Advanced Level consists of three separate syllabi. Each syllabus is self-contained; there are no shared or common elements.

The syllabi must be taught in the following minimum number of days:

Syllabus	Days
Test Manager	5
Test Analyst	4
Technical Test Analyst	3

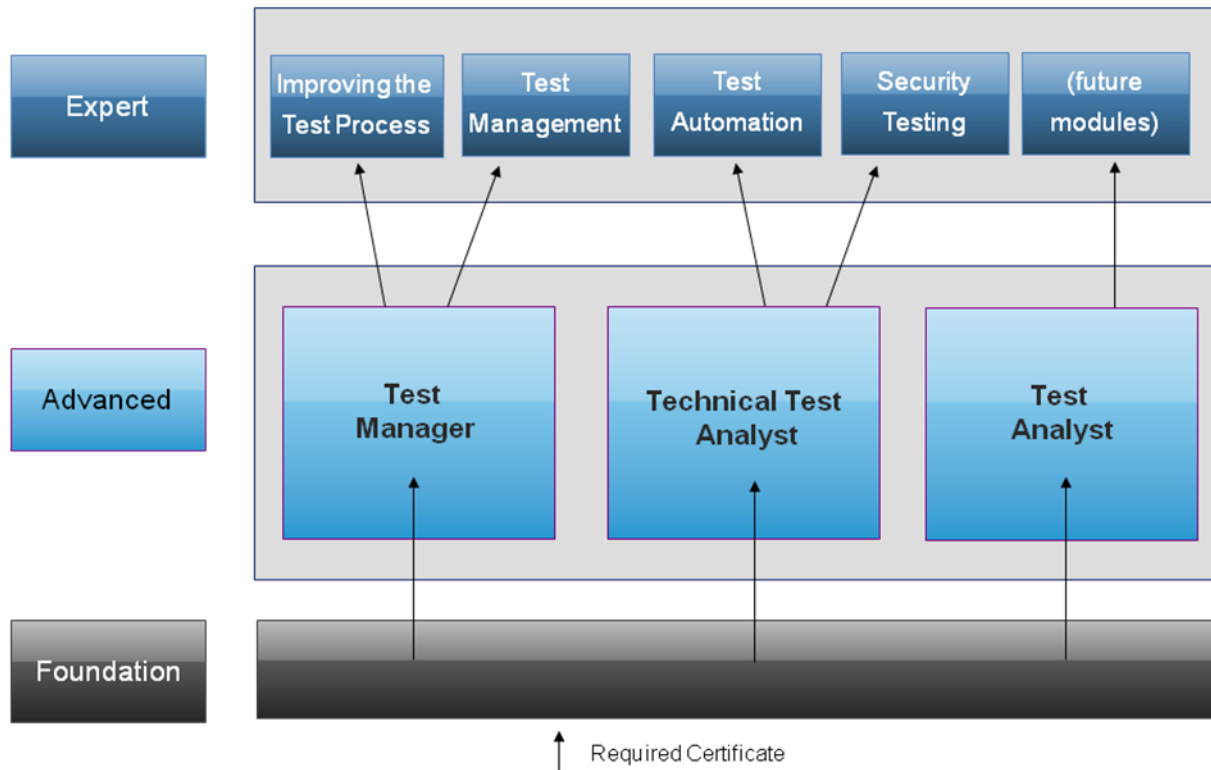
The following figure shows the structure of the Advanced Level and its relationship to the Foundation and Expert Levels. Note that at the time of writing the Advanced Level Test Analyst certification has no direct dependency link to an Expert Level certification. This may change in the future as new syllabi are introduced at the Expert Level.

## 1.6 Handling of Standards

Standards (IEEE, ISO, etc.) are referenced in these syllabi. The purpose of these references is to provide a framework (as in the references to ISO 9126/ISO 25000 regarding quality characteristics) or to provide a source of additional information if desired by the reader. Please note that only the items from these standards that are referenced specifically in the syllabi are eligible for examination. The standards documents themselves are not intended for examination and are included only for reference.

## 1.7 Keeping It Current

The software industry changes rapidly. To deal with these changes and to provide the stakeholders with access to relevant and current information, the ISTQB working groups have created links on the [www.istqb.org](http://www.istqb.org) web site which refer to supporting documents, changes to standards and new occurrences in the industry. This information is not examinable under these syllabi.





## 2. Overview of Advanced Level Syllabi

### 2.1 Advanced Level: Test Manager (TM)

#### 2.1.1 Business Outcomes

This section lists the Business Outcomes expected of a candidate who has achieved the Advanced Test Manager certification.

An Advanced Test Manager can...

- TM1 Manage a testing project by implementing the mission, goals and testing processes established for the testing organization.
- TM2 Organize and lead risk identification and risk analysis sessions and use the results of such sessions for test estimation, planning, monitoring and control.
- TM3 Create and implement test plans consistent with organizational policies and test strategies.
- TM4 Continuously monitor and control the test activities to achieve project objectives.
- TM5 Assess and report relevant and timely test status to project stakeholders.
- TM6 Identify skills and resource gaps in their test team and participate in sourcing adequate resources.
- TM7 Identify and plan necessary skills development within their test team.
- TM8 Propose a business case for test activities which outlines the costs and benefits expected.
- TM9 Ensure proper communication within the test team and with other project stakeholders.
- TM10 Participate in and lead test process improvement initiatives.

In general, an Advanced Test Manager is expected to have acquired the necessary skills to enable further development at the Expert Level in the areas of test management and improving the test process.

#### 2.1.2 Content

##### Chapter 1: Testing Process

- The Test Manager's main activities are covered for each step in the fundamental test process. Emphasis is placed on the tasks of Test Planning, Monitoring and Control. In addition, the Test Manager learns how to implement a project retrospective in order to validate processes and discover areas to improve.

##### Chapter 2: Test Management

- This is the core chapter of the syllabus and accounts for over two days of training out of the five days course.
- The Test Manager should understand how to define test management tasks according to the context of a project. This involves taking all stakeholder needs into account and adjusting test activities to the software lifecycle model.
- Risk-based testing (RBT) for test prioritization and effort allocation is covered in detail. Emphasis is placed on the Test Manager's tasks in identifying, analyzing and assessing risks for the product and the project. The Test Manager learns specific techniques and understands how to take stakeholder views into account when assessing risk levels and when defining the set of test activities needed to mitigate the risks. By performing appropriate risk control activities, the Test Manager learns how to determine residual risks and can report them to project stakeholders such that informed release decisions can be made.

- The Test Manager needs to know how to evaluate different types of test documentation and tailor them to meet project and organization needs. This includes an understanding of relevant standards.
- Estimation of testing effort using specific metrics and based on experience is covered. Techniques required for estimating are covered and the Test Manager should learn how to use available data to communicate the value of testing.
- Test Managers should have an understanding for distributed, outsourced and insourced forms of test organizations.

#### Chapter 3: Reviews

- The activities of the Test Manager focus on defining an appropriate review plan and setting up the review to achieve the best results. The Test Manager should learn how to use metrics to optimize the review results and to show return on investment.
- The Test Manager should understand how to lead a review team through a formal review.

#### Chapter 4: Defect Management

- The Test Manager should know how to set up a defect lifecycle tailored for the adopted software lifecycle.
- The Test Manager should understand the skills to acquire in analyzing defect reports with the objective of evaluating the capability of the testing and software development processes.

#### Chapter 5: Improving the Test Process

- The Test Manager should be aware of the generic steps for conducting a standard test process improvement initiative and how to create a test improvement plan based on these steps.
- Information is provided on the test process improvement models TMMi, TPI Next, CTP and STEP.

#### Chapter 6: Test Tools and Automation

- The Test Manager should be able to plan and implement the selection of different types of tools (including open-source and custom-built tools) such that risks, costs, benefits and opportunities are adequately considered.
- An understanding of using tools for metric collection and evaluation is acquired.

#### Chapter 7: People Skills - Team Composition

- The Test Manager should understand how to assess the availability of soft skills along with the technical, business domain and testing skills required for a testing team, and can define a growth plan for skill development.
- The Test Manager should understand the relevant team motivation and communication skills required.

## 2.2 Advanced Level: Test Analyst (TA)

### 2.2.1 Business Outcomes

This section lists the Business Outcomes expected of a candidate who has achieved the Advanced Test Analyst certification.

An Advanced Test Analyst can...

- TA1 Perform the appropriate testing activities based on the software development lifecycle being used.
- TA2 Determine the proper prioritization of the testing activities based on the information provided by the risk analysis.
- TA3 Select and apply appropriate testing techniques to ensure that tests provide an adequate level of confidence, based on defined coverage criteria.
- TA4 Provide the appropriate level of documentation relevant to the testing activities.
- TA5 Determine the appropriate types of functional testing to be performed.
- TA6 Assume responsibility for the usability testing for a given project.
- TA7 Effectively participate in formal and informal reviews with stakeholders, applying knowledge of typical mistakes made in work products.

- TA8 Design and implement a defect classification scheme.  
TA9 Apply tools to support an efficient testing process.

## 2.2.2 Content

### Chapter 1: Testing Process

- A Test Analyst should understand the importance of involvement throughout the test process, with particular focus on the role and contribution of the Test Analyst, and how those align with the roles of the Test Manager and Technical Test Analyst.
- The Test Analyst's tasks of test analysis and design are described. This includes determining the appropriate uses for concrete and logical test cases as well as defining the pre-conditions and criteria used for starting test execution and determining the status of test completion criteria. The impact of different lifecycle models is a central aspect to these tasks.

### Chapter 2: Test Management: Responsibilities for the Test Analyst

- A Test Analyst should understand the purpose and expected contribution toward the project metrics.
- A Test Analyst should understand how to prioritize on the basis of risks and can schedule business domain-based tests appropriately. This includes understanding the risk assessment impact on test case selection, test coverage and test data tasks.

### Chapter 3: Test Techniques

- Testing techniques belong to the core competencies of the Test Analyst. Specification-based and defect- and experience-based techniques are covered.
- The specification-based techniques introduced at the Foundation level are developed further. These include equivalence partitioning, boundary value analysis, decision tables, state transition testing and use case testing.
- Additional specification-based techniques introduced include classification tree testing, use of orthogonal arrays, pairwise testing, domain analysis and user stories.
- Defect-based techniques, exploratory testing and the use of defect taxonomies are additional techniques covered in the area of defect- and experience-based techniques.
- A Test Analyst should understand how to select the best technique for a given testing situation as well as how to effectively mix techniques to achieve the best testing result.

### Chapter 4: Testing Software Quality Characteristics

- The specific software quality characteristics that apply to the Test Analyst are covered in this section. These include the functional areas of accuracy, suitability and interoperability as well as the non-functional areas of usability and accessibility.
- A Test Analyst should understand how to approach these areas and the testing techniques that can be applied.

### Chapter 5: Reviews

- The activities of the Test Analyst focus on using checklists to identify defects in use cases and in requirements specifications from a tester's perspective. In addition, the Test Analyst learns how to present problems found in a review meeting.
- Several sample checklists are supplied to help guide review sessions for various work products.

### Chapter 6: Defect Management

- Test Analysts should understand how to define defect classification values to be used in a defect management system and how to apply this classification to defects found.
- A discussion of the importance of capturing, refining and using root cause information for process improvement is included in this section. Test Analyst should know how to perform preliminary root cause analysis to help provide good classification information for each reported defect.

### Chapter 7: Test Tools

- This short chapter focuses on the tools and automation issues which are relevant to the Test Analyst. This includes building awareness of business process modeling tools and knowledge of the interactions between the tools typically used by a Test Analyst.

## 2.3 Advanced Level: Technical Test Analyst (TTA)

### 2.3.1 Business Outcomes

This section lists the Business Outcomes expected of a candidate who has achieved the Advanced Technical Test Analyst certification.

An Advanced Technical Test Analyst can...

- TTA1 Recognize and classify the typical risks associated with the performance, security, reliability, portability and maintainability of software systems.
- TTA2 Create test plans which detail the planning, design and execution of tests for mitigating performance, security, reliability, portability and maintainability risks.
- TTA3 Select and apply appropriate structural design techniques to ensure that tests provide an adequate level of confidence, based on code coverage and design coverage.
- TTA4 Effectively participate in technical reviews with developers and software architects applying knowledge of typical mistakes made in code and architecture.
- TTA5 Recognize risks in code and software architecture and create test plan elements to mitigate those risks through dynamic analysis.
- TTA6 Propose improvements to the security, maintainability and testability of code by applying static analysis.
- TTA7 Outline the costs and benefits to be expected from introducing particular types of test automation.
- TTA8 Select appropriate tools to automate technical testing tasks.
- TTA9 Understand the technical issues and concepts in applying test automation.

### 2.3.2 Content

#### Chapter 1: The Technical Test Analyst's Tasks in Risk-Based Testing

- A Technical Test Analyst should understand how to identify, assess and mitigate technical risks.

#### Chapter 2: Structure-Based Testing

- Structural testing techniques belong to the core competencies of the Technical Test Analyst.
- This section builds on the Foundation techniques of statement and decision coverage.
- The structure-based techniques covered are condition testing, decision/condition testing, modified condition/decision coverage (MC/DC), multiple condition testing, basis path testing and API coverage.
- In general, Technical Test Analysts should understand how to choose appropriate structural test technique(s).

#### Chapter 3: Analytical Techniques

- Technical Test Analysts should understand how to apply static analysis to detect potential security, maintainability and testability defects in code.
- The planning of dynamic analysis to mitigate risks in code and software architecture is covered.

#### Chapter 4: Quality Characteristics for Technical Testing

- A Technical Test Analyst should understand how to design high-level test cases for security, performance and reliability quality attributes and to support the Test Manager in creating test strategies to mitigate the identified risks.
- A Technical Test Analyst should understand how to include coverage of maintainability, portability and resource utilization quality attributes in a testing strategy.

#### Chapter 5: Reviews

- The activities of the Technical Test Analyst focus on using checklists to identify defects in code and architecture.

#### Chapter 6 Test Tools and Automation

- This major chapter focuses on the tools and automation issues which are relevant to Technical Test Analysts.
- Several tools are covered, including those used for web-based testing, for supporting model-based testing, for fault seeding and fault injection, for unit testing and the build process and for performance testing.
- A Technical Test Analyst should be able to recognize common technical issues that cause high failure rates in automation projects and to appreciate different automation techniques.
- Specific issues resulting from the use of open-source and custom-built tools are covered.

### 3. Appendix: Main Changes in the 2012 Syllabi

#### Introduction

In this 2012 version of the Advanced Level syllabi, feedback was considered from stakeholders in the market such as training providers and attendees.

#### Improved Scoping

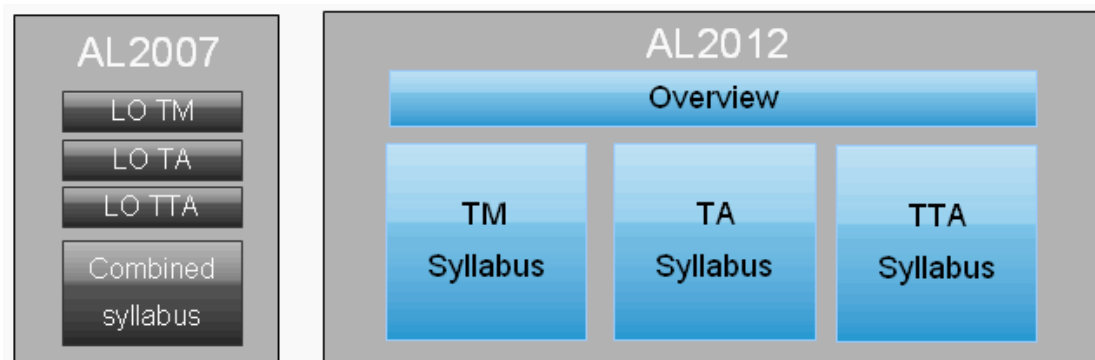
A principal objective of the new Advanced Level Syllabi is to ensure that there is no overlap between any current ISTQB syllabi.

The Advanced Syllabi add to the Foundation Level and fit neatly with the topics managed at the Expert Level (Test Management, Improving the Test Process, Test Automation, etc.).

In addition, the consistency and clear scoping between the three Advanced Level syllabi has been substantially improved.

#### Clearer Organization of the Syllabus

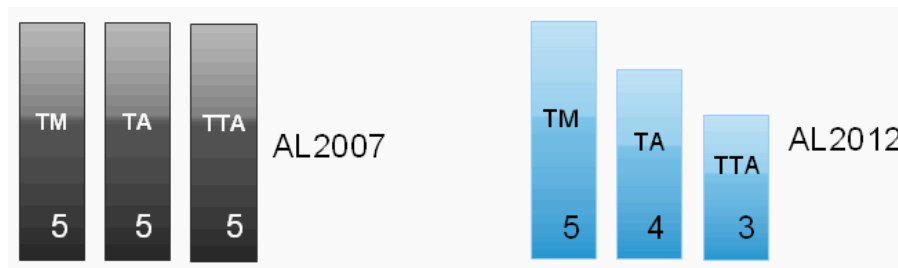
The 2012 Advanced Level Syllabi have been created as three stand-alone syllabi with a single overview document (this document).



This structure makes it clearer for everyone (students, training providers and exam creation teams) to understand what is expected and what is to be covered. This is also consistent with the structure of the Expert Level. The individual Advanced syllabi may evolve separately if needed.

#### Reduced Duration of TA and TTA Syllabi

Stakeholder feedback has been carefully considered in setting the minimum course duration. As a result of careful scoping and a policy of “no overlaps”, the duration of the Test Analyst syllabus has been reduced from five to four days and the duration of the Technical Test Analyst has been reduced from five to three days.



### Business Outcomes Now Form the Basis for the Advanced syllabi

Each Business Outcome provides a statement of what can be expected from a person who achieves the Advanced Level in the particular subject area, (e.g. an Advanced Test Manager). The BOs are listed in this document.

Business Outcomes are specifically directed to the business needs of industry and will particularly benefit businesses who are considering investing in developing the skills of their staff at the Advanced level.

The Learning Objectives of each Advanced Syllabus implement (and are traceable to) the Business Outcomes.

### Improved Learning Objectives

Learning Objectives have been improved by removing potential misinterpretations and by splitting certain “compound” learning objectives into individual parts.

Learning Objectives are now uniquely numbered and placed at the start of each syllabus chapter, in line with Foundation and Expert Level syllabi.

The following example demonstrates these improvements:

2007 syllabus:

(K3) Use the algorithms “Control flow analysis”, “Data flow analysis” to verify if code has not any control or data flow anomaly

2012 syllabus (TTA):

TTA-3.2.1 (K3) Use control flow analysis to detect if code has any control flow anomalies

TTA-3.2.2 (K3) Use data flow analysis to detect if code has any data flow anomalies

### Changes to the Test Management Syllabus

The principal subjects covered remain the same. However, the content has been improved.

Redundancies with FL have been removed (e.g. reviews).

The Expert Level syllabi “Test Management” and “Improving the Test Process” are now available. Scoping and alignment with these syllabi has taken place.

The defect management chapter is no longer based on IEEE-1044 and focuses more on setting up a defect management lifecycle and using defect data for process improvement.

### Changes to the Test Analyst Syllabus

The major concentration of this syllabus remains on the testing techniques and test process.

Domain analysis and user stories are new to the specification-based techniques section.

Content has been significantly revised to align the scope with Foundation, other Advanced Level syllabi and Expert Level Test Automation.

The Test Management and Tools chapters are relatively short and cover only the specific issues relating to the Test Analyst.

The defect management chapter is no longer based on IEEE-1044 and focuses more on defect categorization and performing initial root cause analysis of defects.

### **Changes to the Technical Test Analyst Syllabus**

A significant refocus on the technical aspects of testing has been completed. As a result it is now expected that candidates must be able to read and understand pseudo-code.

The basic aspects of testing and the testing process are now covered in other syllabi.

The test management chapter is relatively short and covers only the specific issues relating to the Technical Test Analyst.

Testing techniques remains a significant part of the syllabus and accounts for approximately one third of the training time. Six techniques are covered, including basis path testing and API coverage. The LCSAJ technique has been removed from the syllabus.

Content has been significantly reduced due to scoping with the other syllabi (in particular Test Analyst).



## 4. Abbreviations

Abbreviation	Meaning
BO	Business Outcome
ISTQB	International Software Testing Qualifications Board
LO	Learning Objective
TA	Test Analyst
TM	Test Manager
TTA	Technical Test Analyst

## 5. References

### 5.1 Trademarks

The following registered trademarks and service marks are used in this document:

ISTQB® is a registered trademark of the International Software Testing Qualifications Board

### 5.2 Documents and Web Sites

<u>Identifier</u>	<u>Reference</u>
[ISTQB-Web]	Web site of the International Software Testing Qualifications Board. Refer to this website for the latest ISTQB Glossary and syllabi. ( <a href="http://www.istqb.org">www.istqb.org</a> )