



# ISTQB® Certified-Tester Implementation of the Syllabus in Universities in Germany

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TU Berlin/Fraunhofer FOKUS  
Oct. 18, 2010

- ➔ I am representing mainly facts, but also selected evaluations. The later are mainly my private opinion and do not necessarily represent the GTB opinion.
- ➔ When referring to universities and students, I refer to all educational institutions and students thereof in non-commercial settings doing trainings towards BSc, MSc, and other professional grades.

- ➔ German Testing Board e.V.
- ➔ ISTQB® Certified Tester – Syllabi and certified training
- ➔ GTB University and Student Support
- ➔ Software Testing Market in Germany
- ➔ Lessons Learnt and Future Targets

- ➔ Founding member of the International Software Testing Qualifications Board ISTQB®
- ➔ Registered association with own regulations
- ➔ Independent, national body in the area of software and system test
- ➔ Development of the valid syllabus and exam questions for the ISTQB® Certified Tester scheme
- ➔ Accreditation of training providers according to the ISTQB® Accreditation Standard
- ➔ Non-profit organization

\*Note: e.V. is the German designation for a legally registered association

- ➔ World-wide standard for the training and further education of software testers
- ➔ Multi-stage syllabus
- ➔ Independent examination authority
- ➔ Internationally recognized certificate



1998	ISEB (Information Systems Examinations Board, part of the British Computer Society) develops the <b>Certified Tester Syllabus</b> . The first Software Testers are certified in 1998.
2001	The <b>German Testing Board</b> is founded. It develops the German language Certified Tester syllabus according to the ISEB ideal and also takes German standards (e.g. DIN) into account.
2002	First certifications „ <b>ASQF®-Certified-Tester (AD V1.0)</b> “ (Arbeitskreis Software-Qualität und -Fortbildung e.V.= Working Group for Software Quality and Training) in German-speaking countries.  The <b>ISTQB®</b> (International Software Testing Qualifications Board), the Swiss Testing Board and the Austrian Testing Board are founded.
2003	The syllabus for the „Advanced Level“ is completed.
2004	First exams for „ <b>ISTQB® Certified-Tester Advanced Level</b> “  The number of national Testing Boards climbs to a total of 14.
2006	The „Expert Level“ syllabus is pre-determined.
2007	CTFL and CTAL syllabi updates. The number of national Testing Boards climbs further to 36.
2010	<b>Expert Level</b> “Improving the Test Process” completed. 46 national Testing Boards established.
Today	<b>More than 145.000 Certified Testers across the world and more than 17.000 German-language exams authorized by the GTB!</b> (Date 10/2010)

## ⇒ Structure

- Umbrella organization for all national Testing Boards
- Working parties for the cooperative creation of syllabi, exam questions, processes etc.



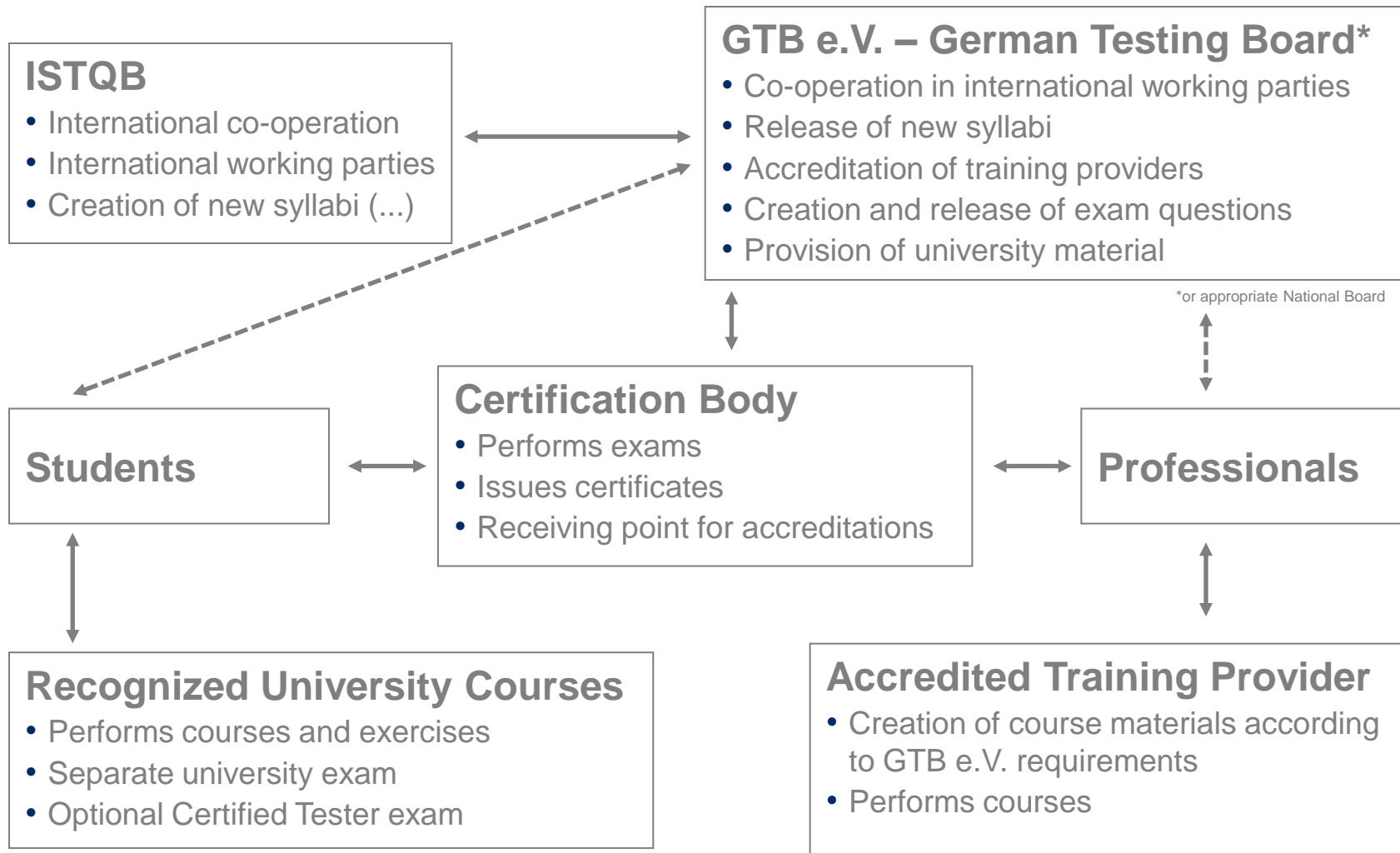
## ⇒ Tasks

- Creation and updating of learning content and syllabi
- Creation and unification of exam questions
- Establishment of procedures and processes

## ⇒ Independent, high-level body

## ⇒ Non-profit organization

- ⇒ Creation of learning content and syllabi in the national language
- ⇒ Accreditation of training providers
- ⇒ **In Germany: authorization of university courses**
- ⇒ Creation of exam questions in the national language
- ⇒ Authorization of Examination Bodies  
(Certification Bodies)
- ⇒ Implementation of procedures and processes

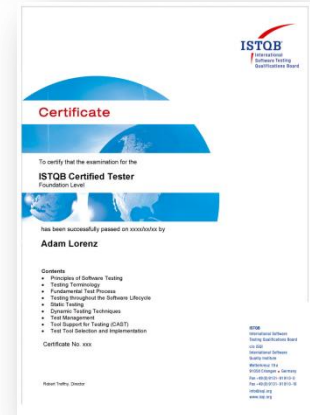


## ➔ 3-stage education program

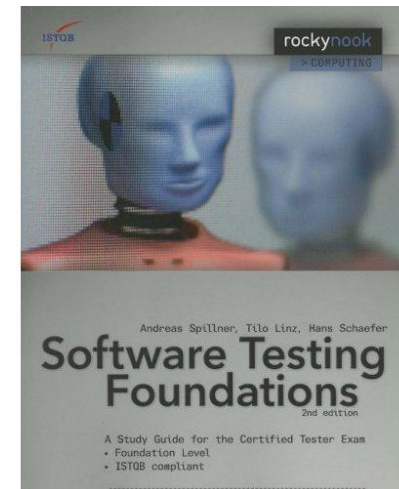
- Expert knowledge
  - Expert Level
- Practical subject knowledge
  - Advanced Level
- Fundamentals
  - Foundation Level

For selected student education only

For student education and certification

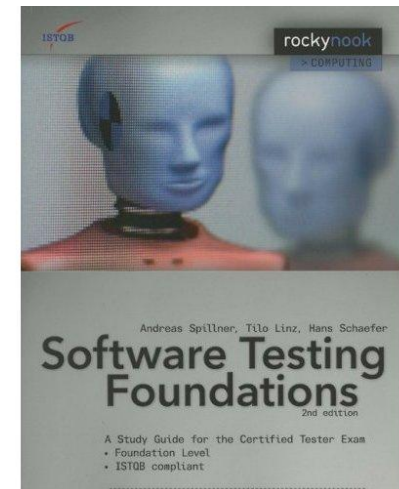


- ➔ Recommended preconditions
  - Development knowledge
- ➔ Contents
  - Software testing fundamentals
  - Testing throughout the software life-cycle
  - Static testing techniques
  - Test design techniques
  - Test management
  - Tool support for testing
- ➔ Duration
  - Appr. 3 days
- ➔ Objectives
  - Teaching the fundamentals and basic knowledge in the field of software testing



Recommended book. This does not replace the syllabus and its contents are non-binding for exam questions.

- ⇒ Recommended preconditions
  - Software engineering courses
- ⇒ Contents
  - Software testing fundamentals
  - Testing throughout the software life-cycle
  - Static testing techniques
  - Test design techniques
  - Test management
  - Tool support for testing
- ⇒ **Student course**
  - **1 term**
  - **Incl. exercises**
- ⇒ Objectives
  - Teaching the fundamentals and basic knowledge in the field of software testing



Recommended book. This does not replace the syllabus and its contents are non-binding for exam questions.

Fundamentals of Testing	Testing Throughout the Software Life Cycle	Static Techniques	Test Design Techniques	Test Management	Tool Support for Testing
Why is Testing Necessary	Software development models	Static Techniques and the Test Process	The Test Development Process	Test Organization	Types of Test Tools
What is Testing	Test Levels	Review Process	Categories of Test Design Techniques	Test Planning and Estimation	Effective Use of Tools
Seven Testing Principles	Test Types	Static Analysis by Tools	Specification-based Techniques	Test Progress Monitoring and Control	Introducing a Tool into an Organization
Fundamental Test Process	Maintenance Testing		Structure-based Techniques	Configuration Management	
The Psychology of Testing			Experience-based Techniques	Risk and Testing	
Code of Ethics			Choosing Test Techniques	Incident Management	

K1
  K2
  K3
  K4

## ➔ Preconditions

- At least 18 months practical experience
- Foundations Certificate

## ➔ Contents

- Test process
- Test management
- Risk-based testing
- Test techniques
- Reviews
- Incident management
- Test process optimization
- Test tools
- Team organization

## ➔ Duration

- Appr. 10-12 days

## ➔ Objectives

- Teaching practical testing knowledge



Recommended books. These do not replace the syllabus and its contents are non-binding for exam questions.

## ➔ Preconditions

- Foundation-level course
- Higher-level courses on software engineering recommended

## ➔ Contents

- Test process
- Test management
- Risk-based testing
- Test techniques
- Reviews
- Incident management
- Test process optimization
- Test tools
- Team organization



## ➔ Student courses

- **Varying, depending on course context**

## ➔ Objectives

- Teaching practical testing knowledge

Recommended books. These do not replace the syllabus and its contents are non-binding for exam questions.

Basic Aspects of Software Testing	Testing Processes	Test Management	Test Techniques	Testing of Software Characteristics	Standards & Test Improvement Process
Testing in the Software Lifecycle	Test Process Models	Test Management Documentation	Specification-Based	Quality Attributes for Domain Testing	Standards Considerations
Specific Systems	Test Planning and Control	Test Plan Documentation Templates	Structure-Based	Quality Attributes for Technical Testing	Improving the Test Process
Metrics and Measurements	Test Analysis and Design	Test Estimation	Defect- and Experience-Based		TMM
Ethics	Test Implementation and Execution	Scheduling Test Planning	Static Analysis		TPI
	Evaluating Exit Criteria and Reporting	Test Progress Monitoring and Control	Dynamic Analysis		CTP
	Test Closure Activities	Business Value of Testing			STEP
		Distributed, Outs. and Ins. Testing			CMMI
<b>People Skills and Team Composition</b>	<b>Test Tool and Automation</b>		<b>Reviews</b>	<b>Incident Management</b>	
Individual Skills	Test Tool Concepts	Risk-Based Testing	The Principles of Reviews	When can a Defect be detected	
Test Team Dynamics	Test Tool Categories	Failure Mode and Effect Analysis	Types of Reviews	Defect Lifecycle	
Fitting Testing Within an Organization		Test Management Issues	Introducing Reviews	Defect Fields	
Motivation			Success Factors for Reviews	Metrics and Incident Management	
Communication				Communicating Incidents	

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Motivation			Success Factors for Reviews	Metrics and Incident Management	
Communication				Communicating Incidents	

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- ➔ Recommended preconditions
  - Advanced Certificate (or appropriate partial certificates)
  
- ➔ Contents
  - Improving the Test Process
  - Test Automation (in preparation)
  - Security Testing (in preparation)
  - TTCN-3 (in preparation)
  
- ➔ Duration
  - Appr. 2-5 days for each module
  
- ➔ Objectives
  - In-depth training in a specialized area of testing

- ➔ preconditions
  - Foundation-level course
  - Higher-level courses on software engineering and advanced-level recommended
  
- ➔ Contents
  - Improving the Test Process
  - Test Automation (in preparation)
  - Security Testing (in preparation)
  - TTCN-3 (in preparation)
  
- ➔ **Student courses**
  - **Varying, depending on course context**
  
- ➔ Objectives
  - In-depth training in a specialized area of testing

- ➔ Examinations for the various training levels are offered and performed by neutral Certification Bodies (Examination Bodies)
- ➔ The Certification Bodies are authorized and named by the GTB
- ➔ Each named Certification Body must fulfill and apply the certification rules and processes of the GTB and the ISTQB®
- ➔ Examination questions come from the GTB and ISTQB®
- ➔ Named Examination Bodies:
  - DLGI ([www.dlgi.de](http://www.dlgi.de))  
Dienstleistungsgesellschaft für Informatik mbH
  - ISQI ([www.isqi.org](http://www.isqi.org))  
International Software Quality Institute GmbH



- ➔ On request from the teacher at the university
- ➔ Alternatively, in open exams by the exam providers
  
- ➔ Student fee is half of the examination fee for professionals
  
- ➔ Successful exams are **supported by GTB**
  - Half of the fee for all students
  
  - Complete fee for Bafög-supported students



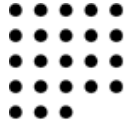
## ⇒ Duration

- An exam lasts 60 minutes

## ⇒ Type of exam

- The exam is in multiple-choice format
- For each question there can be only one correct answer

- ➔ Timea Illes-Seifert, Universität Heidelberg
- ➔ Prof. Dr. Ina Schieferdecker, TU Berlin
- ➔ Prof. Dr. Mario Winter, FH Köln
- ➔ (Prof. Dr. Andreas Spillner, Hochschule Bremen)



Fachhochschule Köln  
University of Applied Sciences Cologne



HOCHSCHULE BREMEN  
UNIVERSITY OF APPLIED SCIENCES



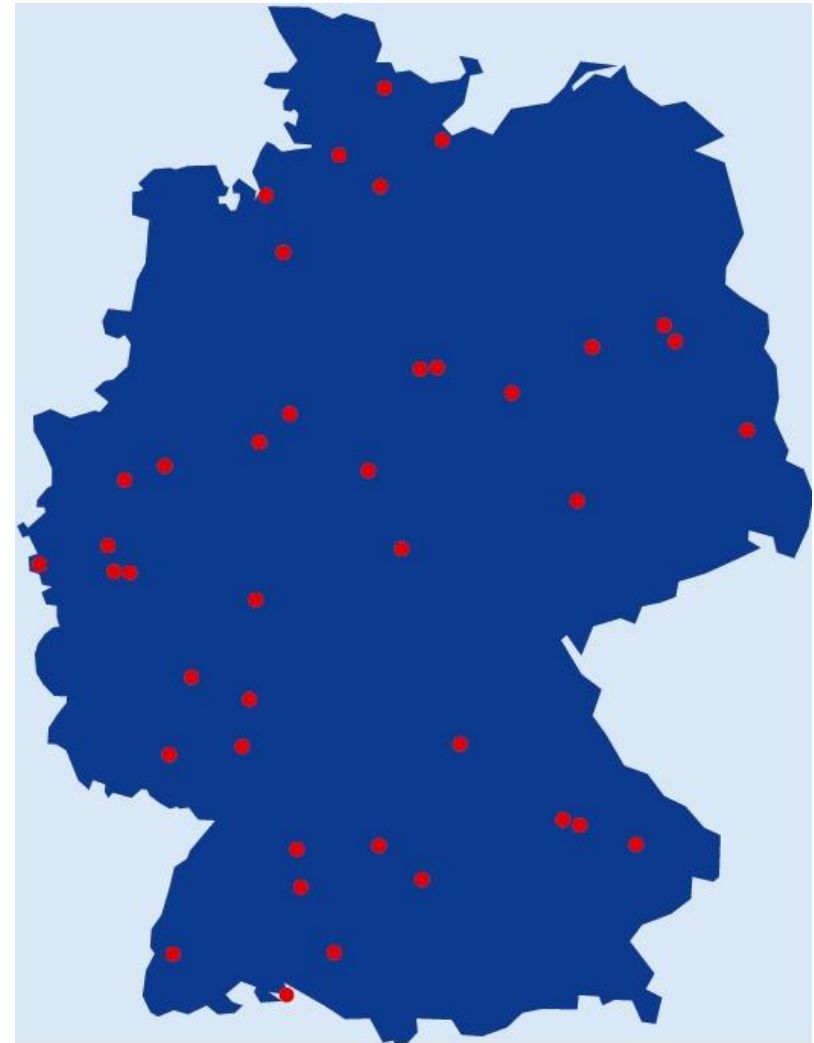
## ⇒ Service

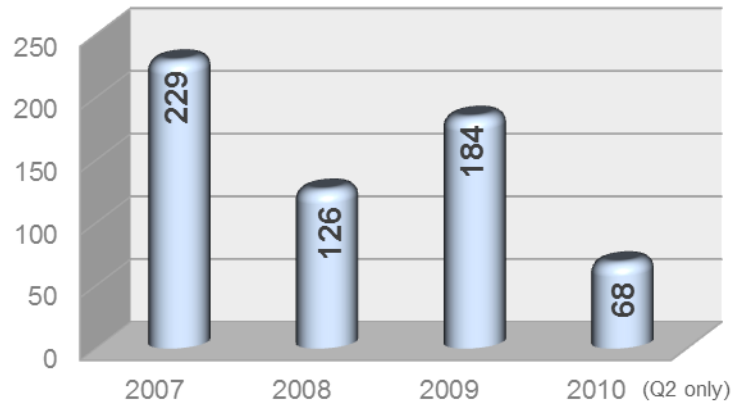
- Slide set for the recent foundation level syllabus
- Set of exercises
- CT examinations by CT certifier  
(separated from the university exams)
- Q&A
- Bi-annual workshops, flyer, newsletter

## ⇒ Formally established end of 2006

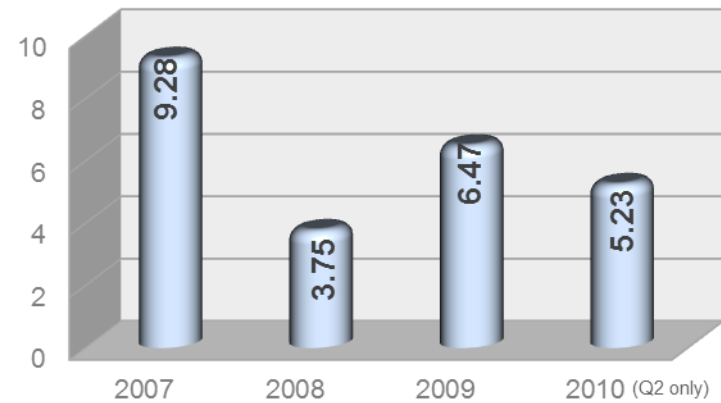
- Agreement between GTB and professors/institutions →  
terms of course approval and material usage

- Albert-Ludwigs-Universität Freiburg
- Berufsakademie Eisenach
- Berufsakademie Ravensburg
- Brandenburgische Technische Universität Cottbus
- Duale Hochschule Baden-Württemberg
- Fachhochschule Aachen
- Fachhochschule Bingen
- Fachhochschule Bonn-Rhein-Sieg
- Fachhochschule Brandenburg
- Fachhochschule Braunschweig/Wolfenbüttel
- Fachhochschule Kaiserslautern
- Fachhochschule Kiel
- Fachhochschule Köln
- Fachhochschule Lübeck
- Fachhochschule Nordakademie, Elmshorn
- Fachhochschule Regensburg
- Fachhochschule Reutlingen
- Freie Universität Berlin
- HAW Hamburg
- Heinz-Nixdorf-Berufskolleg, Essen
- Hochschule Aalen
- Hochschule Anhalt
- Hochschule Bonn-Rhein-Sieg
- Hochschule Bremen
- Hochschule Bremerhaven
- Hochschule Deggendorf
- Hochschule Harz
- HTWG Konstanz
- Hochschule Ostwestfalen Lippe
- Justus-Liebig Universität Giessen
- Staatliche Studienakademie Leipzig
- Technische Universität Berlin
- Technische Universität Braunschweig
- Technische Universität Darmstadt
- Technisch-Gewerbliches Berufsbildungszentrum Dillingen
- Universität Dortmund
- Universität Erlangen-Nürnberg
- Universität Göttingen
- Universität Mannheim
- Universität Paderborn
- Universität Regensburg





Absolute student numbers



Relative student numbers

## ➔ For the employee

- Certification of his/her knowledge
- Recognition of his/her role as a tester
- Testing knowledge is necessary

## ➔ For the company

- Qualification and motivation of employees
- Testing is taken more seriously
- Uniform language, knowledge and procedures

## ➔ For the project

- Testing competence available to the project

## ➔ Recommendation:

At least one Certified Tester in each project!



## ➔ For the student

- Testing knowledge is necessary for profession
- Relevant and recent knowledge
- Certificate to demonstrate industry-relevant training

## ➔ For the university

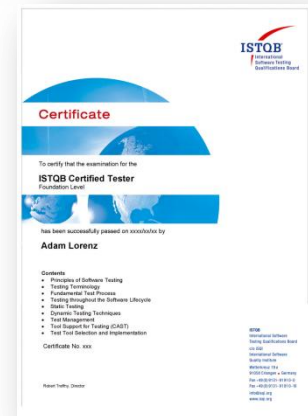
- Industry-relevant courses
- Ready-to-use materials
- Active research and education community

## ➔ For the future employer

- All advantages as before

## ➔ Recommendation:

At least one Certified Tester course in each software-related syllabus



## ⇒ Top 20 Standard Software Companies in 2008 by Lünendonk, May 2009

1. Microsoft Deutschland GmbH, Unterschleißheim
2. SAP AG, Walldorf
3. Oracle Deutschland GmbH, München
4. Datev eG, Nürnberg
5. Adobe Systems GmbH, München
6. CompuGroup Holding AG, Koblenz
7. Novell GmbH, Düsseldorf
8. Infor Global Solutions Deutschland AG, Friedrichsthal
9. CA Deutschland GmbH, Darmstadt
10. SAS Deutschland, Heidelberg
11. PSI AG, Berlin
12. BMC Software GmbH, Frankfurt am Main
13. Software AG, Darmstadt
14. Sage Software GmbH, Frankfurt am Main
15. Addison Software und Service GmbH, Ludwigsburg
16. Nemetschek AG, München
17. Mensch und Maschine Software SE, Wessling
18. Interflex Datensysteme GmbH & Co. KG, Stuttgart
19. Schleupen AG, Moers
20. Beta Systems Software AG, Berlin

→ **7,55 Billion EUR Revenues in Germany in 2008**



Bitkom: German ICT Sector Index 2010

## ICT in Germany, Bitkom, 2010

- 830.000 jobs
- 3,8 % local content
- 18.000 companies
- 145 Billion EUR domestic market
- 24 % of all patents
- 57 Billion EUR export
- 33% growth share

**DELIGO**

**BERATUNG UND SELEKTION VON  
FACH- UND FÜHRUNGSPERSÖNLICHKEITEN**

Möchten Sie bei einem Weltmarkt führenden High-Tech-Unternehmen sein? Fühlen Sie sich in einem globalen und hoch professionellen Umfeld wohl? Dann freut sich unser Kunde Sie kennen zu lernen!

Unser Kunde ist ein renommiertes Unternehmen mit zentraler Rolle im weltweiten Forschungs-, Entwicklungs- und Produktionsnetzwerk innerhalb eines Weltmarktes. Im Rahmen eines Bereichsaufbaus, welcher sich mit Entwicklung und dem Vertrieb von Softwarelösungen beschäftigt sind wir auf der Suche nach einem erstklassigen Mitarbeiter.

**Test Manager (m/w)**

Sie zeichnen sich verantwortlich für die Planung von Testkampagnen sowie deren Koordination mit dem Tester-Team, die Erstellung von Testplänen und Testreports. Entwicklung und Durchführung von Tests. Anleitung bei deren Ausführung innerhalb definierter Zeit- und Budget-Rahmen. Unterstützung bei der Erstellung und Review detaillierter Anforderungen und Spezifikations-Dokumente. Unterstützung bei der Integration in andere Software-Projekte. Permanente Optimierung der Arbeitsabläufe, um Qualität und Effizienz zu steigern.

Sie sind eine Person mit einem entsprechenden Hochschulabschluss mit mindestens zweijähriger Berufserfahrung oder mehrjähriger Erfahrung im Umfeld Software-Entwicklung und Testcase Design. Ein entsprechendes Zertifikat (z.B. SAQ/ISTQB-Certified-Tester) ist von Vorteil. Sie sind ein guter Koordinator und verfügen über eine analytische Denkweise. Gute Deutsch- und Englischkenntnisse sowie Freude an der Kommunikation sind von Vorteil.

Es erwartet Sie eine spannende Herausforderung in einem renommierten internationalen Umfeld. Interessante Anstellungsbedingungen sowie vielseitige Entwicklungsmöglichkeiten sind für unsere Kunden selbstverständlich.

Interessiert? Gerne erwarten wir Ihre Bewerbung. Ihre Unterlagen werden streng vertraulich behandelt. Diskretion, Qualität und Professionalität sind für uns selbstverständlich!

**SESsupport: Software-Validierung**

**Software-Validierung**

**Testmanagement:**

Um die Qualität von Software zu gewährleisten, ist ein strukturierter und kontrollierter Testprozess Voraussetzung.

Unsere Mitarbeiter im Bereich Softwaretest werden deshalb als **ISTQB Certified Tester** geschult.

Wir führen auch externe Tests außerhalb unserer eigenen Entwicklungsabteilung durch und besitzen langjährige Erfahrung in den folgenden Bereichen:

- Testmanagement
- Testdurchführung
- Dokumentation
- Testautomatisierung

**Änderungsmanagement:**

Ein weiterer wichtiger Baustein im Zusammenspiel zwischen Software-Entwicklung und Test bildet der Bereich des Änderungsmanagements. Ein effektives **Änderungsmanagement** umfasst alle Maßnahmen zur effizienten Erfassung, Speicherung, Verteilung und Kontrolle aller Änderungsdaten.

**daemons point**

News Produkte Services **Unternehmen** Referenzen Support

Unternehmen

daemons.point > Unternehmen

**daemons point - das Unternehmen**

1994 wurde von den beiden Geschäftsführern Steffen Walter und Uli Heller die daemons point GmbH gegründet.

Das Geschäftsfeld umfasst:

- Entwicklung von kundenspezifischer Software
- professionelle Dienstleistungen rund um Software-Qualitätssicherung
  - Design
  - Entwicklung autor
  - Ausführung auton
  - Analyse der Resu
  - Abnahmetests
  - uva.
- technische Kundenberatung

**seibersdorf research**  
Ein Unternehmen der Austrian Research Centers.


Unsere Kompetenzen: **Forschung & Entwicklung** → **Produkte & Dienstleistungen** Partner & Referenzen

**Entwicklung sicherheitskritischer Software**

In vielen Bereichen müssen die eingesetzten Systeme sicher und zuverlässig funktionieren. Bereits ein kleinster Fehler kann Menschenleben in Gefahr bringen und katastrophale Auswirkungen haben.

Neben den klassischen Sicherheitstechnik-Domänen wie Luftfahrt, Eisenbahnwesen und Industriesteuerungen werden heute auch in Automobilbau und sogar im Bereich kleiner Geräte des täglichen Bedarfs Sicherheitsfragen mehr und mehr in den Mittelpunkt gerückt. Zunehmend spielt die Zertifizierung nach internationalen Normen wie z.B. der EN ISO/IEC 61508 für Industriesteuerungen oder EN ISO/IEC 50126, 50128 und 50129 für Eisenbahnsysteme eine entscheidende Rolle.

Unsere langjährige Praxis in Design, Entwicklung und Prüfung solcher komplexer, sicherheitskritischer Software schaffen die besten Voraussetzungen, unseren Partnern sichere und verlässliche Systeme auf höchstem Qualitätsniveau anbieten zu können.



So können wir im Bereich der Eisenbahnsicherungs- und -wartung stolz auf eine fast zwanzigjährige Erfahrung und erfolgreiche Kooperation mit Alcatel Austria AG zurückblicken. Über hundert Stellwerke in Österreich und Ungarn steuern - mit unserem Toolset "ELEPRO" projektiert - täglich tausende Züge sicher und verlässlich durch das Schienennetz.

Die Programmiersprache Ada, gepaart mit langjährigem Knowhow, erlaubt uns hier, über nunmehr fast zwei Jahrzehnte laufende Weiterentwicklungen unter Aufrechterhaltung der Qualität und Wartbarkeit zu integrieren. Aber auch im Umfeld jüngerer Sprachen und Entwicklungsplattformen fühlen wir uns zuhause, so zählen zu unserem Team etwa auch Sun certified Java™ Programmierer und Developer.

Die gesamte Qualität der von uns entwickelten Systeme wird durch unsere **ISTQB Certified Tester** gewährleistet.

## ⇒ Software tester offers as of Oct. 15, 2010

- Job Scout24: 271 offers
- Job Börse: 142 offers
- Monster.de: 85 offers
- Gigajob in Germany: 65 offers
- ...

## ⇒ Communities

- ASQF: over 1000 members
- Various online groups
  - LinkedIn: Global Testing Professionals, Software Testing & Quality Assurance, etc.
  - Xing: Agile Testing, etc.
  - Facebook: Software testing, etc.
- Various blogs
- ...

➔ **Alex Bögli, Zühlke Engineering AG:**

»The certification provides us with a common language.«

➔ **Dr. Karin Vosseberg, pdv.com Beratungs-GmbH:**

» The certificate has brought me more recognition in my role as quality coach. I now have better access to my colleagues. «

➔ **Robin S. Heizmann, CREDIT SUISSE:**

»Approximately 250 IT people in the Credit Suisse Private Banking Division in Switzerland are ISTQB® Certified Tester (SAQ) Foundation, with currently 40 of them also certified at Advanced level. appr. 200 IT people work in Software Testing, which represents at least 10% of the development organization. This means that more people are Certified Testers than work in the test organization. The training and certification were considered by the participants to be both helpful and relevant. For the Software QA separate career tracks for the roles Test Expert, Test Designer and Test Manager have been established. The Foundation Certificate is obligatory for all roles and for Test Managers also the Advanced Certificate. Substantial software quality improvements have already been achieved in the year following the introduction of the measures.«

## ➔ Christian Blank, ATLAS ELEKTRONIK GMBH:

As a student at the Bremen University in the degree course „Computer Engineering“, Christian Blank enrolled for the elective course “Basic knowledge – Software testing”. He took this opportunity to take the examination for the ISTQB® Certified Tester. He was motivated and encouraged by the experiences of the course lecturer, Prof. Dr. Andreas Spillner. During his lecture he had reported about the feedback he had from former students, who had told him that the knowledge about systematically tested software was required in the economy and presents a distinct career advantage. The experiences which Christian Blank made at the end of his studies further confirmed these reports.

Since June 2009, the former student has now been employed with ATLAS ELEKTRONIK GmbH as test engineer in the area of software integration and test. He is convinced that it was the ISTQB®-certificate that opened the door for him to his job interview.

## ⇒ Status

- Successful establishment at universities
- Integration with ASQF (free one year membership for all certified students) and GI TAV (TAV-Junior for software-testing PhD students)

## ⇒ Lessons

- Open setup gives room for various course formats
- Regular interaction with teachers helpful (workshops, newsletters, etc.)
- Extension/integration of the online teacher/student community to be considered

## ⇒ Future targets

- 10% student exams
- Better feedback loop from teachers to GTB
- Definition as mandatory element in software-related syllabi



# Many thanks for your attention!

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