ISTQB® (International Software Testing Qualifications Board – www.istqb.org) has created the world’s most successful scheme for certifying software testers. As of December 2017, ISTQB® has administered well over 785,000 exams and issued more than 570,000 certifications in over 120 countries world-wide, with a growth rate of about 65,000 certifications per year.

As a nonprofit-organization with its mission of “advancing the software testing profession”, ISTQB® regularly conducts survey to assess the trends in testing industry world-wide. Such report are publicly available on the ISTQB® Web Site. In 2015 we conducted the first survey looking at the “Worldwide Software Testing Practices”, that is now followed by the second edition, that is published in this report.

The report covers several topics, ranging from organizational and budgetary aspects, to techniques/ processes/ tools, through skills and competencies; we think it provides useful information for all the professionals involved in the testing market, as well as direction for the further evolution of the ISTQB® scheme. This is an exciting time in the testing industry and the report data will significantly help the evolutions that ISTQB® is currently undertaking to ensure we develop and maintain syllabi that continue to reflect changing testing practices and that meet market demands.

The report was designed by the ISTQB® Marketing Working Group and endorsed by ISTQB® Member Boards, accredited training providers and exam providers, collecting more than 2000 responses from 92 countries.

I would like to thank all of you who responded to the survey; your valuable feedback will contribute to the improvement of the ISTQB® scheme.
More than 2,000 people from 92 countries contributed to the ISTQB® Worldwide Software Testing Practices Report 2017-2018. In this year’s report, respondents’ geographic distribution is quite well balanced.

Test analyst, test manager and technical test analyst titles are the top three titles used in a typical tester’s career path.

The outcome of the 2017 - 18 report is mostly in parallel with the results of the one done in 2015 - 16.

Top five test design techniques utilized by software testing teams are use case testing, exploratory testing, boundary value analysis, checklist based, and error guessing.

New technologies or subjects that are expected to affect software testing in near future are security, artificial intelligence, and big data.

Main improvement areas in software testing are test automation, knowledge about test processes, and communication between development and testing.

Trending topics for software testing profession in near future will be test automation, agile testing, and security testing.

Non-testing skills expected from a typical tester are soft skills, business/domain knowledge, and business analysis skills.
EXECUTIVE SUMMARY

Since the first release of ISTQB® World Software Testing Practices Report in 2015, many software development and technology trends have emerged or increased their prevalence. Agile frameworks, DevOps, continuous integration, continuous delivery, continuous testing, artificial intelligence, big data etc., continue to have an impact on how organizations develop software. Our latest report suggests that the challenges associated with these “hot topics” are recognized and driving developments in testing approaches and skills needs.

In the latest report, respondents indicate that:
- Testing responsibility: In-house test team, developers, end-users
- Improving the competency level of testers: Training on the job, certification of competencies, formal training
- SDLC model used: Agile, sequential, iterative
- Defect finding before test execution: review of requirements, review of designs, source code inspection
- Career path for a tester: Test analyst, test manager, technical test analyst
- Career path for a test manager: Test department director, project manager, development manager
- Tools used: Defect tracking, test automation, test execution
- Main objectives of testing activities: To detect bugs, to show the system is working properly, to gain confidence
- Main improvement areas in software testing: Test automation, knowledge about test processes, communication between development and testing
- Test techniques utilized (top five): Use case testing, exploratory testing, boundary value analysis, checklist based, error guessing
- Test levels most budget allocated: System, integration, user acceptance, unit/component

The results above are similar to those in the 2015-2016 report; differences highlighted in the latest report include:
- Slight decrease in percentage of budget allocated to software testing in IT/R&D projects
- Increase in software testing budget expectations for the next 12 months
- Increase in test automation

Respondents confirmed the following trends/technologies and challenges:
- Agile projects’ testing challenges: Test automation, documentation, collaboration
- New technologies or subjects: Security, artificial intelligence, big data
- Trending topics for software testing: Test automation, agile testing, security testing
- Non-testing skills expected from testers: Soft skills, business/domain knowledge, business analysis

The comparisons and analysis indicate that traditional testing practices and techniques continue to be relevant; however, what were the challenges of tomorrow are now realities as reflected in the main areas for improvements and skills requirements for test professionals. Thank you to all respondents for supporting us in this report.
GEO DISTRIBUTION

Europe: 27%
North America: 27%
Central and South America: 7%
Africa: 1%
Asia: 33%
Oceania: 1%

TO WHICH INDUSTRY DOES YOUR ORGANIZATION BELONG?

51% Information Technologies
13.7% Financial Services
5.5% Healthcare and Medical
5.3% Telecom, Media and Entertainment
3.3% Automotive
3.1% Public Sector
2.7% Consumer Products, Retail and Distribution
2.1% Education
1.8% Manufacturing
1.5% Energy and Utilities
1.3% Transportation
1.1% Not currently employed
0.6% Business Services (Hotels, Lodging Places)
7% Other
Almost half of all respondents are testers. 77% of responders are working in technical positions and 23% in managerial positions. Respondents indicated that amongst their organizations a majority are assigning their testing to an in-house test team (79.7%) and 30% of all respondents are using in-house test teams only.
How does your organization improve the competency level of your testers?

* Selecting multiple choices were available

- **69.9%** Training on the job
- **50.2%** Certification of competencies
- **42%** Formal training
- **27.2%** Participation at conferences
- **14.7%** None

Formal training (42%) and certification (50.2%) rated highly as approaches to improving the competency of testers after on the job training (69.9%).

Main testing budget allocation is 11-25% from a typical IT/ R&D project. There is a slight trend to reduce the budget allocated to software testing in comparison to 2015-2016 results.

What percent of a typical IT/ R&D project budget is allocated to software testing?

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>0% - 10%</td>
<td>28.8%</td>
<td>21.7%</td>
</tr>
<tr>
<td>11% - 25%</td>
<td>41%</td>
<td>42.3%</td>
</tr>
<tr>
<td>26% - 40%</td>
<td>21.7%</td>
<td>26.9%</td>
</tr>
<tr>
<td>&gt; 40%</td>
<td>8.5%</td>
<td>9.1%</td>
</tr>
</tbody>
</table>

Main testing budget allocation is 11-25% from a typical IT/ R&D project. There is a slight trend to reduce the budget allocated to software testing in comparison to 2015-2016 results.
WHAT IS YOUR EXPECTATION FOR YOUR ORGANIZATION’S SOFTWARE TESTING BUDGET IN THE NEXT 12 MONTHS?

This year respondents are slightly more optimistic in comparison with the previous report, regarding expectations of growth in the budget allocated to testing for the next 12 months (61.1% vs 59.2%).

- We are expecting a significant decrease: 2.7%
- We are expecting a slight decrease: 5.3%
- Stable: 30.9%
- 1% - 10% growth: 18.2%
- 11% - 20% growth: 14.4%
- 21% - 30% growth: 10.6%
- 31% - 40% growth: 6.5%
- 41% - 50% growth: 5.5%
- More than 50% growth: 5.8%
WHICH ACTIVITIES DO YOU USE TO FIND DEFECTS BEFORE TEST EXECUTION?

* Selecting multiple choices were available

<table>
<thead>
<tr>
<th>Activity</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formal review of the analysis documents/requirements</td>
<td>69%</td>
</tr>
<tr>
<td>Formal review of the design documents</td>
<td>45.1%</td>
</tr>
<tr>
<td>Source code inspection</td>
<td>28.2%</td>
</tr>
<tr>
<td>Static analysis tools</td>
<td>27.2%</td>
</tr>
<tr>
<td>None</td>
<td>13.9%</td>
</tr>
<tr>
<td>Other</td>
<td>5.5%</td>
</tr>
</tbody>
</table>

Review of the analysis documents/requirements remains the most widespread activity for early detection of defects.

WHAT ARE THE MAIN OBJECTIVES OF YOUR TESTING ACTIVITIES?

* Selecting multiple choices were available

- To detect bugs: 88.1%
- To show the system is working properly: 68.6%
- To gain confidence: 55%
- To evaluate the user experience: 45%
- To evaluate requirements: 51.2%
- To comply with regulations: 34.6%
- To be a customer advocate: 27.4%
- To have zero defects: 15.8%
- Other: 1.8%

As in the previous report, the main objective of respondents testing activities is “To detect bugs (88.1%). Next top three most popular answers are “To show the system is working properly” (68.6%), “To gain confidence” (55%) and “To evaluate requirements” (51.2%).
Which of the below testing types and/or topics are important for your organization?

* Selecting multiple choices were available.

### Testing Types

- **Functional Testing**: 83%
- **Performance Testing**: 60.7%
- **Security Testing**: 44.6%
- **Usability Testing**: 44.1%
- **Accessibility Testing**: 28.2%
- **Reliability Testing**: 22.4%
- **Testability**: 20.5%
- **Availability Testing**: 19.8%
- **Maintainability Testing**: 19.3%
- **Efficiency Testing**: 18.8%
- **Scalability Testing**: 15.5%
- **Interoperability Testing**: 15.4%
- **Operability Testing**: 12.8%
- **Portability Testing**: 11.1%
- **Recoverability Testing**: 10.4%
- **Supportability Testing**: 6.7%
- **Extensibility Testing**: 4.2%

### Testing Topics

- User Acceptance Testing: 66%
- Exploratory Testing: 53.3%
- Systems Integration Testing: 46.1%
- Web Based Application Testing: 44.3%
- Mobile Testing: 43%
- Release Management: 33.8%
- Test Data Management: 28.7%
- Test Environments Management: 26.9%
- Configuration Management: 24%
- Test Metrics and Test Effort Estimation: 23.5%
- Non-regression Testing: 23.5%
- Static Testing: 22%
- Testing Systems of Systems: 16.1%
- Cloud Testing: 15.3%
- Business Intelligence / Big Data Testing: 13.6%
- Embedded Systems Testing: 10.2%
- Internet of Things Testing: 7.2%
- Other: 3.1%

Functional testing (83%) is the most important type of testing in respondent’s organizations. This might be expected as without functionality all other non-functional aspects of a system become irrelevant.

With the increasing importance of users, functional testing is followed by user acceptance testing (66.0%). Performance testing (60.7%) is selected as the most important non-functional testing type among all other non-functional test types.
What are the main improvement areas in your testing activities?

* Selecting multiple choices were available

<table>
<thead>
<tr>
<th>Area</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test automation</td>
<td>64.4%</td>
</tr>
<tr>
<td>Knowledge about test processes</td>
<td>46.5%</td>
</tr>
<tr>
<td>Communication between development and testing</td>
<td>44.9%</td>
</tr>
<tr>
<td>Communication between project management and testing</td>
<td>31.8%</td>
</tr>
<tr>
<td>Test data preparation</td>
<td>31%</td>
</tr>
<tr>
<td>Having well trained personnel</td>
<td>27%</td>
</tr>
<tr>
<td>Maintaining test cases</td>
<td>41.7%</td>
</tr>
<tr>
<td>Communication between business analysis and testing</td>
<td>41%</td>
</tr>
<tr>
<td>Knowledge about test design techniques</td>
<td>38.5%</td>
</tr>
<tr>
<td>Budget</td>
<td>20.9%</td>
</tr>
<tr>
<td>Unrealistic expectations of other stakeholders from test team</td>
<td>19.4%</td>
</tr>
<tr>
<td>Time</td>
<td>33.3%</td>
</tr>
<tr>
<td>Prioritization</td>
<td>32.7%</td>
</tr>
<tr>
<td>Other</td>
<td>2%</td>
</tr>
</tbody>
</table>

Similar to the previous ISTQB® Worldwide Software Testing Practices Report conducted in 2015-2016, top three improvement areas in testing activities in this year’s report are test automation (64.4%), knowledge about test processes (46.5%), and communication between development and testing (44.9%).

The forth ranked item in 2015-2016’s report, knowledge about test design, is replaced by maintaining test cases (41.7%) in this year’s report.
What are your top testing challenges in your Agile projects?

* Selecting multiple choices were available

<table>
<thead>
<tr>
<th>Challenge</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Automation</td>
<td>43.4%</td>
</tr>
<tr>
<td>Documentation</td>
<td>34.7%</td>
</tr>
<tr>
<td>Collaboration</td>
<td>28.9%</td>
</tr>
<tr>
<td>Test Effort Estimation</td>
<td>28.7%</td>
</tr>
<tr>
<td>Exit / Entry Test Criteria</td>
<td>26.9%</td>
</tr>
<tr>
<td>Risk Awareness</td>
<td>25.2%</td>
</tr>
<tr>
<td>Cross Functional Needs</td>
<td>24.6%</td>
</tr>
<tr>
<td>Quality Ownership</td>
<td>23.8%</td>
</tr>
<tr>
<td>Decision Making</td>
<td>20.4%</td>
</tr>
<tr>
<td>Traceability</td>
<td>19.5%</td>
</tr>
<tr>
<td>Test Reporting</td>
<td>18.7%</td>
</tr>
<tr>
<td>Legacy Defects</td>
<td>15.5%</td>
</tr>
<tr>
<td>Not Applicable</td>
<td>13.7%</td>
</tr>
<tr>
<td>Regulatory / Compliance Issues</td>
<td>9.2%</td>
</tr>
<tr>
<td>Other</td>
<td>3.6%</td>
</tr>
</tbody>
</table>

The top three testing challenges in Agile projects are test automation (43.4%), documentation (34.7%), and collaboration (28.9%). The root cause behind these challenges may be continuously evolving nature of software in Agile projects, cultural challenges/ resistance to Agile ways of working. All of these challenges make test effort estimation hard to predict which is the forth ranked challenge in the question (28.7%).
**WHICH CAREER PATH**

**IS MORE COMMON FOR A TESTER IN YOUR ORGANIZATION?**

- Tester → Test Analyst: 29.5%
- Tester → Test Manager: 25.6%
- Tester → Technical Test Analyst (performance, security, automation etc.): 14.4%
- Tester → Business Analyst: 7.1%
- Tester → Developer: 5.1%
- Tester → Scrum Master: 3.5%
- Developer → Tester: 3.1%
- Business Analyst → Tester: 2.2%
- Tester → IT Architect: 0.7%
- Other: 8.8%

Test Analyst (29.5%) and Test Manager (25.6%) are the most typical career paths for testers within respondent’s organizations. No change from the previous report.

**WHAT COULD BE THE NEXT LEVEL IN THE CAREER PATH FOR A TEST MANAGER?**

- Test Department Director: 40.7%
- Project Manager: 40.1%
- Development Manager: 4.4%
- Chief Technology/Information Officer: 3.4%
- Other: 11.4%

Test Department Director (40.7%) and Project Manager (40.1%) are the most typical career paths for Test Managers within respondent’s organizations. In the last report 44% and 37% respectively for these careers.
Which testing skills do you expect from testers?

* Selecting multiple choices were available

<table>
<thead>
<tr>
<th>Skill</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Execution</td>
<td>70.1%</td>
</tr>
<tr>
<td>Bug Reporting</td>
<td>68.1%</td>
</tr>
<tr>
<td>Test Design</td>
<td>67.3%</td>
</tr>
<tr>
<td>Test Analysis</td>
<td>67.1%</td>
</tr>
<tr>
<td>Test Automation</td>
<td>62.3%</td>
</tr>
<tr>
<td>Test Planning</td>
<td>60.6%</td>
</tr>
<tr>
<td>Test Strategy</td>
<td>52.9%</td>
</tr>
<tr>
<td>Test Implementation</td>
<td>50.4%</td>
</tr>
<tr>
<td>Test Monitoring</td>
<td>38.2%</td>
</tr>
<tr>
<td>Bug Advocacy</td>
<td>29.9%</td>
</tr>
<tr>
<td>Other</td>
<td>2.7%</td>
</tr>
</tbody>
</table>

Report results indicate that there are at least eight skills which are rated 50% or above by the respondents. This result shows that a good tester should have a holistic understanding of the testing process which is not only limited to test execution (70.1%) and bug reporting (68.1%). Test design (67.8%), test analysis (67.7%), test automation (62.3%), test planning (60.6%), test strategy (52.9%), and test implementation (50.4%) are as important as or even more important than just running tests and reporting bugs.
Which of the following non-testing skills are most expected from an Agile tester in your organization?

* Selecting multiple choices were available

<table>
<thead>
<tr>
<th>Skill</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soft Skills</td>
<td>54.8%</td>
</tr>
<tr>
<td>Business / Domain Knowledge</td>
<td>41.9%</td>
</tr>
<tr>
<td>Business Analysis</td>
<td>40.9%</td>
</tr>
<tr>
<td>Tool Knowledge</td>
<td>40.1%</td>
</tr>
<tr>
<td>Risk Estimation</td>
<td>38.9%</td>
</tr>
<tr>
<td>SDLC Knowledge</td>
<td>33.5%</td>
</tr>
<tr>
<td>Continuous Integration</td>
<td>32.7%</td>
</tr>
<tr>
<td>Workload Estimation</td>
<td>28.8%</td>
</tr>
<tr>
<td>Database</td>
<td>28.2%</td>
</tr>
<tr>
<td>Coding</td>
<td>26.1%</td>
</tr>
<tr>
<td>System Analysis</td>
<td>25.9%</td>
</tr>
<tr>
<td>Project Management</td>
<td>18.3%</td>
</tr>
<tr>
<td>UX/CX</td>
<td>13.5%</td>
</tr>
<tr>
<td>Network</td>
<td>9.8%</td>
</tr>
<tr>
<td>Enterprise Analysis</td>
<td>6.9%</td>
</tr>
<tr>
<td>Other</td>
<td>2%</td>
</tr>
</tbody>
</table>

Soft skills (54.8%) and business centric skills such as business/domain knowledge (41.9%), and business analysis (40.9%) skills are more expected than other non-testing skills from an Agile tester according to the survey respondents.
Which of the following non-testing skills are most expected from non-Agile testers in your organization?

* Selecting multiple choices were available

- Soft Skills (Presentation, Communication, Conflict) 45.2%
- Business / Domain Knowledge 38.9%
- Business Analysis 37.7%
- SDLC Knowledge 34.6%
- Tool Knowledge 34.1%
- Risk Estimation 33.3%
- System Analysis 30.2%
- Database 26%
- Workload Estimation 25.5%
- Project Management 20.8%
- Coding 20%
- Continuous Integration 17.8%
- UX/CX 11.1%
- Enterprise Analysis 10.4%
- Other 2.7%

Similar to Agile Testers, Non-Agile Testers are also expected to have soft skills (45.2%), business/domain knowledge (38.9%), and business analysis (37.7%) skills. According to the report, forth ranked non-testing skill expected from non-Agile tester is SDLC knowledge (34.8%) and fifth is tool knowledge (34.1%).
Which tools do you use in your organization?

Defect tracking: 80.6%
Test automation: 70.1%
Test execution: 69.7%
Test management: 65.2%
Performance testing: 51.2%
Requirements traceability: 45.8%
Test design: 43.9%
Unit testing: 43.8%
Static analysis: 27.9%
Dynamic analysis: 17.2%
Dynamic analysis: 2%

There is no significant change in the types of tools used since the last report. The most commonly used tools among test teams are defect tracking, test automation, test execution and test management.

What is the percentage of automated test cases you use with respect to your overall test cases?

1% - 10%: 27.7%
11% - 20%: 19.4%
21% - 30%: 15.4%
41% - 50%: 9%
31% - 40%: 8.9%
More than 50%: 19.6%

The percentage of companies that do not use automated tests is still high (21.2%). Almost half of respondents that implemented automated tests reported that their coverage is up 20%. Leading industries with coverage of more than 40% are automotive (59.2%) and telecom, media and entertainment (27.1%).
To which test level(s) is most of your budget allocated?

The top five test techniques selected by survey respondents are the same as those selected by the survey respondents for the report conducted in 2015-2016. Beginning from the highest ranking technique, top five techniques are use case testing (73.0%), exploratory testing (67.2%), boundary value analysis (52.3%), checklist based (49.7%), and error guessing (36.0%). Compared to the previous report, only boundary value analysis and checklist based techniques switched their rankings. While the boundary value analysis technique moves up in the ranks and becomes the third ranked item, checklist based technique moves down in the ranks and becomes the fourth ranked item.

There has been no change in ranking since the last report in 2015-2016. Again, system testing (52.1%) is absorbing most of the testing budget; followed by integration testing (39.2%), user acceptance testing (38.1%), and unit/component testing (21.5%).
WHICH NEW TECHNOLOGIES OR SUBJECTS WILL BE IMPORTANT TO THE SOFTWARE TESTING INDUSTRY IN THE FOLLOWING 5 YEARS?

Security testing (52.2%) is considered as the most important subject to the software testing industry in the next 5 years. Exponential growth in computational power and available data make artificial intelligence (49.9%) and big data (49.0%) as the second and third most important subject to software testing industry respectively.

* Selecting multiple choices were available

- Security: 52.2%
- Artificial Intelligence: 49.9%
- Big Data: 49%
- Cloud: 48.8%
- Continuous Integration: 39.9%
- Continuous Testing: 38.7%
- DevOps: 37.7%
- Performance: 37%
- Machine Learning: 36.5%
- IoT - Internet of Things: 34.9%
- Usability: 25.5%
- Cognitive Test Automation: 23.2%
- Scalability: 17.7%
- Microservices: 15.6%
- Healthcare Devices: 12.8%
- Wearables: 12.6%
- Augmented Reality: 11.9%
- Neuronal Networks: 11.9%
- Serverless Architectures: 9.7%
- Application Containerization: 7.6%
- Other Technologies or Subjects: 31%
What will be the most trending topic for software testing profession in near future?

Test automation is ranked as the highest trending topic for the software testing profession in the near future (refer also to Question on page 20 where test automation is also highlighted as the main improvement area in software testing). Increasing adoption of Agile frameworks and growing security issues in IT industry make agile testing (57.5%) and security testing (49.0%) as the second and third most important trending topic respectively.
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