The Future of Testing

ISTQB Expert Level: Test Management for Complex Systems

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Complex systems require competence in Quality Assurance and Testing

Today's IT projects are getting more and more challenging in terms of required quality, possible time and available budget. Typical characteristics of their implementation are globally dispersed teams, many different programming paradigms and techniques used, endless lists of peripheral systems that have to be integrated, consideration of different and partially national regulations, and the necessity to synchronize different processes and release plans. For the people involved in the development of such complex systems the challenge is not restricted to planning, design, and implementation. In particular, there is a need for skills enabling scalable and continuous quality assurance and testing. The corresponding methods have to be carefully applied to guarantee a well-defined total system quality. This means that complex systems require a high competence of the people involved in quality assurance and testing.

Test managers must smoothly integrate testing in the overall process

From a quality assurance point of view, two system levels are important: The first one is focused on single modules and applications being part of the overall system. The second one considers the end-to-end-quality, based on the quality of the first level, but enhancing it by additional aspects. It's the test manager's task to ensure that every relevant module/application has a corresponding quality and that these different quality assurance activities are synchronized for enabling assuring and testing the end-to-end-quality. In the end he is responsible for the total quality that is delivered. Additionally he is responsible for the alignment between achieved quality and desired quality (not necessarily perfect quality) by using existing testers and corresponding methods and techniques.

The importance of his role is often undermined by high time pressure and the fact that testing is the last step in the overall process chain in many organizations. This balancing requires exquisite skills for the test manager. On the hard skills side, this does not only mean detailed knowledge about different testing techniques and their related advantages and disadvantages, but includes orchestrating them to an overall testing strategy and synchronizing them into an overall test plan. On the soft skills side, the increasing complexity of today's IT projects requires more and more management skills, consisting of leadership capabilities, stakeholder management as well as the ability to smoothly integrate own processes into an overall process chain.

Typical examples are

- controlling single testers and their tasks
- synchronizing test activities between different test factories dispersed worldwide
- efficient usage of test environments and test tools
- aggregating test reports to an overall quality report
- adjustment of test plans after a change in the project master plan

These challenges are even more difficult to fulfill in an agile environment, where many fine granular iterations each require a detailed test report to be used as input for the next iteration. Maintaining long-term plans with a reservation scheme for necessary test environments and peripheral systems is a challenge on its own.

Where to learn those skills to be a suitable test manager? How to get familiar with test challenges in complex systems? What certifications exist today as indicator for knowing the test Best Practices? How much money do we spend in the competence of our own or others' skills to be successful test managers?

Become a Certified QA and Test Manager

In this section, we present the results of two studies and the corresponding offers of the ISTQB and its German national board, the GTB.

The software test study [C] contains the results of an online survey with the topic „software test in the practice" from the year 2011. All in all, 1623 people from small to big companies from German speaking countries (DACH) participated in the survey. More than 50% of the participants completed the questionnaire. The goal of the survey was to investigate if the state of the practice from 1997 until today has changed.

The study contains five statements about the expected changes from 1997 to 2011. In the following, we describe the main results: Today, quality-assuring means are more often applied in early phases than in 1997 - the focus of quality assurance remains on the late phases. There are, however, differences in safety-critical domains. Furthermore, agile development approaches are used by 25% of all participants, which is an increase compared to 1997. Scrum is the main player in this field. Despite the high expectations, however, agile engineering processes do not result in higher quality. For instance, domain experts are included in only 33% of the agile projects - in contrast to 50% in classic phase-oriented projects. Today, the job of a tester has a much better reputation than 14 years ago. 77% of the participants stated that tests are run and managed by trained testers. 74% of testers and managers are aware of the ISTQB training scheme. 70% of the participants are certified Foundation Level testers - 90% of them consider this training helpful. The survey also shows that the planned Expert Level modules meet the actual interests of the participants. Furthermore, test automation has gained a lot of attention: more than 26% of the participants stated that their unit tests are 100% automatically executed. Here, too, the agile approaches with only 43% automated tests show some weakness. There seems to be no trend towards the outsourcing of unchallenging testing activities. Contrary to the expectations, the primary goal of quality assurance is the increase of the product quality; decreased costs are ranked only second place.

The BITKOM study [D] is focused on the chances of training in the sense of a life-long learning and the corresponding support of human resource departments of companies in the telecommunication domain. The opportunities that trainings give are important for the struggle against an insufficient number of domain experts. Companies that offer training to their employees are very attractive for experts, especially for the younger ones. Companies in the telecommunication domain offer 4.5 days of training per year, which is considerably higher than the inter-domain average of 2.5 days per year. The study also shows that companies are more successful if the management steers the personal qualification programs compared to companies in which employees manage their training. Certificates like, e.g., the ones of the ISTQB, are a strong motivation for personal qualification. Companies apply all kinds of trainings from in-house seminars to web-based seminars.

An extensive and state of the art, high-quality training is a mandatory prerequisite and often a key factor for the success of products and projects. Hard skills and soft skills of test teams are both important and should be checked already during recruiting. In this respect, the worldwide known and leading qualification standard of the certified tester scheme has proven itself. The International Software Testing Qualifications Board (ISTQB®) is responsible for this scheme, which in Germany is supported by the German Testing Board (GTB). The tester certification schemes „Foundation Level" and „Advanced Level" cover general quality assurance techniques as well as testing independent of programming practices or paradigms. Both schemes are well established with more than 20,000 certificates in Germany alone (as of 2011-09-30).

ISTQB Expert Level: The „black belt" for testing complex projects

A few months ago, the ISTQB introduced two syllabi for a new, third level of the Certified Tester qualification, called "Expert Level", which adds to the Foundation and Advanced Level. This

Certified Tester Expert Level will be continuously upgraded and extended in the future by further syllabi and testing related topics. The new level targets experienced testing professionals who want to deepen their know-how and specialize in certain fields of test management or testing. The "Expert Level" courses are bundled in modules which can be selected separately. The syllabi for two of these modules are already finished and have been released: "Test Management" and "Improvement of the Test Process" both concentrate on the management aspect of testing – especially of testing for large-scale, complex and heterogeneous IT systems. The more "technical" modules on "Test Automation" and "Security Testing" are in development.

Certified "Experts" will be able to improve both effectiveness and efficiency of the overall testing workflow as well as the test suites themselves. Here, "testing" is not only considered within the scope of software, but within the scope of systems: "[A] system may also include hardware, middleware and firmware." ([A], p. 14). With such a comprehensive concept of testing at its core, the "Expert Level" has to cover a wide spectrum of know-how.

In the "Test Management" module experts get to know the strategic aspects of testing and testing workflows: the influence of businesses' strategic and quality objectives and their influence on testing methodology, standard testing strategies, various ways to measure and control the effectiveness, efficiency of tests etc. They also learn how to align testing to business strategies in order to improve the impact on desired business outcomes.

In the "Improving the test process" module, experts learn how to improve existing test processes and tests. Typical reasons for improvements are explained and the model-based and analytical approaches are introduced, which can be taken for the creation and the implementation of improvement programs. A thorough examination of generic improvement approaches, such as the "IDEAL framework" as well as in-depth coverage of model-based and analytical approaches to test process improvement deepens the experts' methodological knowledge. Chapters on management, leadership and change management enhance their social skills.

Further information about the Expert Level is available from the ISTQB website as a downloadable overview document [B].

Other training courses

In addition, the German Testing Board offers another GTB-developed training scheme for experienced testing professionals. This scheme allows for learning or refreshing technical and soft skills which are vital for the work as software tester.

This scheme, the "TTCN-3 Certificate", has been very successful so far. TTCN-3, or "Testing and Test Control Notation Version 3", is an internationally standardized language for testing and certifying which was established by ETSI. The test-oriented and implementation independent semantics of the language supports object-oriented programming, encapsulation, modularization and re-use, which makes it a means to both improve test design efficiency and ensure the re-usability of test automation and certification suites. The language was established e.g. within the telecommunications industry, but has started to play a bigger role in other industries as well. Currently, the TTCN-3 Certificate® is only offered by the GTB in Germany.

Summary

The ever increasing requirements in functionality, performance and quality have to be fulfilled by large and complex IT systems. This demands, beside the knowledge about IT architectures and suitable programming techniques, also appropriate methods, processes and organization in quality management, assurance and testing.

We need stability and flexibility; stability within the fundamentals of our knowledge, our education and our basic roles, and flexibility and openness in the approach we apply in projects. Both sides are especially important for the area of quality management, assurance and testing in large complex systems with heterogeneous development and dispersed teams. We need experts and specialists in testing. The ISTQB certification scheme is a powerful and proven collection of best practices for those experts. The new ISTQB Expert Level is the ultimate level for those test managers who want to demonstrate their being an expert and who are willing to maintain this level of expertise.

References

[A]   ISTQB(R) (Eds.): Certified Tester Expert Level Syllabus. Improving the Test Process. n.l., 2010

[B]   Click downloads at http://www.istqb.org

[C]   A. Spillner, K. Vosseberg, M. Winter, P. Haberl: "Softwaretest-Umfrage 2011", available at www.softwretest-umfrage.de

[D]   Bitkom Servicegesellschaft mbH, Kienbaum Management Consulting, F.A.Z.-Institute: „BITKOM-Studie: Weiterbildung in der ITK-Branche 2011", available at http://www.bitkom-service.de/files/documents/Weiterbildung-in-der-ITK-Branche-2011.pdf

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