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THE T-SHAPED TESTER
by ERIK VAN VEENENDAAL

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THE **T-SHAPED** TESTER

In recent years the way software is being developed has changed dramatically. In addition to the rapid and dynamic changes currently in the software development arena, there is an increased growth in innovation, new technologies, and expansion of IT throughout most industries. There has been a large shift towards adopting an Agile and DevOps way of working. Agile typically provides benefits such as the ability to better manage changing priorities, improved project status visibility, increased team productivity and better delivery predictability. However, many organizations are struggling with Agile and scaling Agile, and it has become apparent that moving towards Agile does not automatically also guarantee improved software quality. Testing, although in Agile organized differently compared to traditional organizations, is still and will remain an important part of software development. This is not only due to the importance of software in today's society, but also due to the many (technical) challenges that IT project are facing, e.g., increasing complexity, new technologies, systems-of-systems, variety of devices and OS's and security vulnerabilities. All of this implies that the required knowledge and skill set for a tester is also changing. In this paper, we will discuss the set required for a tester to add value and survive in the rapidly changing IT world.

A broader knowledge and skill set

As stated, testers need to change their attitude and broaden their knowledge and skill set. They need to become a so-called T-shaped person (tester). Knowledge and skills will be a challenge in the near future for many testers. It is just not good enough anymore to understand testing and hold an ISTQB certificate. Testers will also most often not work any longer in their safe independent test team environment. They will work more closely together with business representatives and developers helping each other when needed and as a team trying to build a quality product. Besides strong soft skills, it is also expected from testers to have, amongst other, domain knowledge, requirements engineering and scripting skills. One must become a "tester plus", someone who can test, but also organize testing and supports others in testing. In short a tester, than can do much more than just test.

The concept of a T-shaped person is of course popular in the Agile world and refers to the need for cross-skilled developers, business analysts and testers in an Agile team, e.g., a Scrum team. In practice, many talk about being a T-shaped tester, but only a few truly are. Let's try to define the knowledge and skill set required to be a true T-shape tester, but before let's look more in detail on what the concept of a T-shaped person actually means and stands for.

The concept of T-shape

The concept of T-shaped skills, or T-shaped people, is a metaphor originally used in job recruitment to describe the abilities of people in the workforce. The vertical bar on the T represents the depth of related skills and expertise in a single field, whereas the horizontal bar is the ability to collaborate across disciplines with experts in other areas and to apply knowledge in areas of expertise other than one's own (see figure 1). More in detail the horizontal stroke is composed of two things. First, empathy. It's important because it allows people to look at a problem from another perspective - to stand in somebody else's shoes. Second, T-shaped people tend to get enthusiastic about other people's disciplines, to the point that

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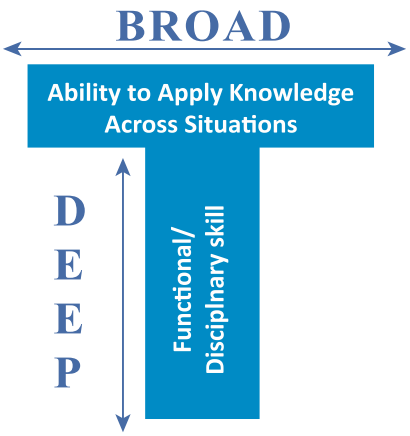

Figure 1: T-shaped person

they may actually start to practice them. T-shaped people have both depth and breadth in their skills.

To better understand what a T-shaped person is, it is perhaps easier to first understand what the converse, a so-called I-shaped person, is. An I-shaped person is one who is a functional expert- their functional expertise being represented by the vertical stroke in the letter I. There is of course nothing wrong in being an I-shaped person - a functional expert. However, no matter how good the I-shaped functional experts are at their individual functions, what they lack is not only an appreciation of their fellow co-workers' areas of expertise, but also the training to actually find solutions at the intersection of their respective functional areas.

Let's now compare the I-shaped persons to those being T-shaped. A T-shaped person is typically multi-function aware, collaborative, and seeking to learn more about how their function impacts others and the end product. T-shaped people are far more flexible, and more able to easily catch on to new trends, but are of course not as substantial in each adjacent discipline as in their primary skill. Contrary to the I-shaped person, the T-shaped specialist tends to get the general picture rather than immerse themselves in details, unless it's really needed.

T-shaped people and the teams they work in can achieve results far better than teams that consist of only so-called I-shaped people. But the development of T-shaped people is a serious, long-term undertaking and most often largely underestimated. It requires people with the right attitude and self-determination to start, but thereafter it requires effort to continue to provide them with the training and resources they need and the type of save collaborative environment that allows for T-shaped people and teams to perform at their best.

The T-shaped Tester

To drive a career in software testing, what are the most valuable knowledge and skills to acquire? While in previous decades there was a demand for I-shaped testers, there is now a fast growing need for T-shaped people. Those who have deep knowledge and skills in one discipline and in addition general knowledge across disciplines, will much easier be able to work and adapt in changing environments. In the Agile world, the T-shaped tester is a team member whose key expertise is testing, but who can also provide support in other activities, for example, activities that lie in the fields of programming or business analysis (requirements engineering). So, in the context of becoming T-shaped, we should look for the skills that can potentially boost the testers' profile. For a professional software tester, good options would be:

- *Testing:* have a deep and broad knowledge across the testing domain
- *Development:* business analysis, programming, technical writing, etc.
- *Domain knowledge:* Medicine, Insurance, Banking, IoT, etc.
- *Soft skills:* they have a positive impact on personal effectiveness, leadership and collaboration with others.

Discussing the skills set of T-shaped testers, we should also be aware of the proportions between 'horizontal' and 'vertical' aspects in the skill set. Depending on the working environment, the need in each family of skills will differ. Those who have very deep and narrow expertise in an area can become over-skilled, as employers don't tend to pay for skills they don't need. Those who have broader skills can feel the lack of expertise in their key discipline at some point and will need to catch up. Hereafter the four knowledge and skill areas identified above for the T-shaped tester are elaborated upon with examples.

Deep: Testing Knowledge and Skills

Today's tester needs to have acquired a full toolbox with varying test methods and techniques that they can draw upon. Working in a team, depending on the context and charter, the most appropriate methods and techniques shall be selected from the toolbox. Trying to define the toolbox for the tester, and thus the testing knowledge and skills required, the ISTQB product portfolio can be used as a reference model. Although there is much criticism on ISTQB in some testing communities, from a content point-of-view there is without doubt much interesting material available across many areas of testing documented in the various syllabus. ISTQB today is much much more than the basic ISTQB foundation level syllabus.

If we take the ISTQB product portfolio as a starting point, many interesting topics and syllabi are available. Trying to define the required testing knowledge and skills, it is at least strange to see that ISTQB does not consider Agile testing to be a part of the core

set of knowledge and skills. It is defined within the portfolio as a separate stream. Also interesting to see that test automation and mobile application testing are considered to be a specialist areas within testing. Today, these are almost like standard requirements for a tester. The fact that these were originally defined as specialist areas by ISTQB, perhaps shows how quickly the market changes. What is defined as a specialist area today, could well be a common requirement for all testers tomorrow.

The picture hereafter (figure 2) is by no means intended to be complete or based on some extensive survey. It is intended to show on a high-level what is expected from a professional tester in terms of testing knowledge and skills today, and for sure tomorrow.

Having attended an ISTQB Foundation course (and having passed the exam) and subsequently stating you are a professional tester ready for the future, is almost like a joke. An ISTQB Foundation course teaches the basics and principles of testing only and -doesn't get the job done. One will also need to be trained in Agile testing. However, the real meat is in attending more advanced hands-on, practical courses and workshops in which you will learn how to actually apply testing practices in context. These advanced courses should include areas such as test automation and mobile application testing, and of course should be taught from an Agile perspective. Following the T-shaped concept and requiring a deep knowledge in testing, we do not expect testers to choose between follow-up areas such as test manager, test analyst or technical test analyst. We expect testers to cover all three areas and become a true professional. For example, there are fewer dedicated test managers or test leads. Many testers today are embedded in an Agile team, as such they perform testing tasks, but also coach and support business analysts doing functional user story based testing and developers doing automated unit testing. Being a tester in an Agile team also means you are heavily involved in tasks that were originally in the exclusive domain of the test manager, e.g., product risk sessions, estimations, retrospectives, reporting, etc.

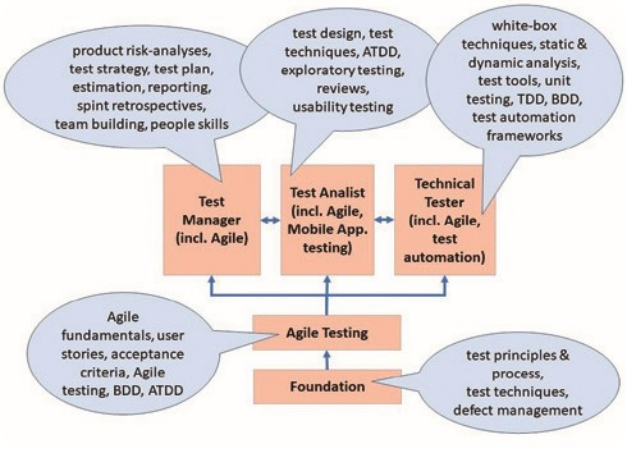

Figure 2: Tester knowledge and skill set

Broad: IT Knowledge and Skills

Working in a cross-functional team, closely with developers and business analysts, implies that a tester needs to at least appreciate and understand what other team members are doing and preferably also be able to support them in their tasks. From a T-shaped tester, it is typically expected that they can support a software developer with unit testing, e.g., reviewing unit tests, and a business analyst with requirements engineering, e.g., defining acceptance criteria for user stories. It is also expected to thoroughly understand the life cycle model that is being used, and the technical environment in which development takes place.

IT knowledge and skills for a T-shaped tester covers a wide and varying range of which some essential examples are listed hereafter.

- Requirements engineering / Business analysis
- Programming / Scripting
- Web and mobile technologies
- Software development lifecycle
- Project management
- Configuration management.

Broad: Domain Knowledge

In this context, domain knowledge is defined as knowledge about the work and office environment in which the target system operates. For a tester it's important to understand the domain in order to be able to communicate with business stakeholders (product owners), but also to make the right decisions while performing testing activities. Remember, exhaustive testing isn't possible, and testers make trade-off decisions all the time. What features are most important to test, which configurations occur most often, etc.? Hence, for a tester possessing domain knowledge along with the other skills is a big plus. In the context of being a T-shaped tester, there are also benefits outside of testing. A tester with domain knowledge can much better support a business analyst, or assist other team members by bringing the necessary domain perspective.

Some examples where a tester will benefit from having domain knowledge include:

- Better understanding risks and writing better test case
- Better understanding impact
- Finding more important defects
- Being able to prioritize defects better
- Being able to review more effectively.

Domain knowledge is undoubtedly a critical success factor for testers. When testing an application, it is important to be able to think from an end users perspective since they are the ones who are going to use the product. Domain knowledge typically includes user profiles, workflows, business processes, business policies and configurations. Without going into detail on how to acquire business and domain knowledge, there is of course much more than just attending a training, also consider apprenticing, observing users/ customers actually using the application, visiting on-line forums and becoming part of communities.

Note, there seems to be a tendency to prefer technical testers in the Agile community, but as we have learned in this paragraph

there is also a strong need and benefit to having testers with domain knowledge and even with a domain background, e.g., end-users that have become testers. Of course there never is a right answer in these kind of situations, but it is something that needs to considered and balanced when assigning testers to a team and defining a required knowledge and skills set for the T-shaped tester.

Broad: Soft Skills

Any T-shaped tester working in an (Agile) team should also possess so-called soft skills (also known as people skills). Soft skills relate to attitudes and intuitions. They relate to how one works with others. Testers have an instinct and understanding for where and how software might fail, and how to find defects. A tester should also have the soft skills to influence and communicate in a manner that they become vital to the project. Testing requires a full set of soft skills including communication, teamwork, eagerness to learn and critical thinking, but also relatively standard soft skills such as reading, reporting and presentation skills . Some of these skills allow a tester to be better at finding defects, but most of them relate to being better at communicating a, most often difficult, message. Possessing these soft skills is like a prerequisite to have the right attitude for being a T-shaped open-minded tester within an Agile team, e.g., have empathy towards other disciplines, knowledge sharing and being a team player. Being a T-shaped tester implies their soft skills can also be used to support other team members at their tasks.

Hereafter, some of the important soft skills which a tester should possess in order to excel in his field are listed:

Communication

- Time management
- Analytical and detail oriented
- Eager to learn
- Critical thinking
- Knowledge sharing
- Team player.

Conclusions

With the current state-of-the-practice of the IT industry, we are far from achieving zero defects. Software testing is and will remain an indispensable part of software development. The required knowledge and skills of the test professional are discussed. In detail, the T-shaped tester was presented and explained. In practice, many talk about being a T-shaped tester, but I believe in reality we are often far from being one. Testers should broaden their knowledge and skills and become a true test professional (T-shaped tester).

For testers driving their career, it is extremely important to define ones individual direction of growth and development. Not forgetting the T-shaped concept, base your choice on your own strengths and passions, and take into account your work environment (lifecycle, domain), trends in the industry and the current (and future) demands of the job market. In addition, reviewing your career plan on a regular basis will help you to stay on top, and get the best value out of the work you do.