Characteristic Traits of Software Testers

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ABSTRACT

Although there has been extensive research on software testing technicalities - such as testing tools and practices - little research have been conducted within human factors of software testing. In collaboration with Itera, a consultancy company, we begin to fill this research gap. Our current qualitative data-set consists of observation notes, interview transcripts, and conversation logs. Our findings suggest that creativity, being structured, having the ability to see the whole picture, having good interpersonal skills, and eagerness-to-learn are desired traits for a software tester.

CCS CONCEPTS

• **General and reference → Empirical studies**; • **Software and its engineering → Software verification and validation**;

KEYWORDS

Human factors, characteristics, software testing, agile software development, character traits, soft skills

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1 SETUP AND MOTIVATION

The industrial experience described here is the current findings of collaboration with a consultancy company, Itera. Itera has over 500 employees across Europe and is involved in the banking and finance sector. There are currently nine consultants working as testers and test-leads in Norway. As such, current findings are based on the data collected from five of these consultants.

Within the software testing field, research focusing on human factors or the psychological aspect of testing is scarce [6, 8]. Moreover, the practitioner literature, such as the ISTQB foundation level syllabus - one of the most recognizable certifications within software testing - mentions little on the topic at hand [2]. We searched for papers focusing on human factors in the field of software testing in agile projects. A search in Scopus returned approximately 500 papers, where only 17 were relevant studies focusing on the topic in the period 2009 - 2019.

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Itera's motivation for collaborating with researchers is to better understand how to support the testers they have employed, and what traits the company should look for when they hire new software testers. The company aims to get a better insight into how testing is conducted so that they can improve continuously. They want to give their testers autonomy to think differently, be more creative, and become more proficient in testing skills.

2 METHODS AND MODES OF ENGAGEMENT

So far, we have conducted five interviews with software testers in the company. These testers' working experience range from one year to six years. We have observed participants working, and we also have access to their communication on Slack. The data-sets, therefore, consists of observation notes, interviews, and chat logs. On the days of observation, the first author noted down timestamps and points of interest with focus on the tester within the project.

Moreover, interviews were held both within and external from the project of observation. These ranged approximately from 45 minutes to 1 hour and were held solely with testers from the consultancy company. All interviews have been transcribed. Logs from communication tools were also used in order to extract additional support for the data collected through observations and interviews, such as follow-ups or elaborations. We analysed the data using thematic analysis [3].

3 TRAITS OF THE SOFTWARE TESTER

Our analysis of the data material revealed five characteristic traits of the software testers, which we will describe in this section.

A trait that all participants mentioned was creativity. The interviewees mentioned the importance of being creative in order to find abnormal bugs. One participant stated *"I've managed to find weird bugs by being creative, such as mid-way force shutdowns and performing unusual process-sequences. One has to test like that because the users are always creative"*. Several participants also mentioned curiosity as an essential trait, such as being curious of domain knowledge and question the requirements' reasoning. One participant described that curiosity allowed him to learn domain knowledge swiftly, and mentioned that his knowledge even surpassed the product owner's.

Additionally, all five participants shared a common trait of being structured. One participant recalled *"Every Friday, I look at the calendar for what's happening next week. Once a month, I also look through the calendar and see what's going to happen next month, so that I may plan ahead"*. Another participant added *"I can't function if there is no structure. I need to have everything noted down in my calendar, and to-do's needs to be written down in checklists and notes.*

Moreover, the ability to understand the big picture was something that was discovered from every participant; they stated it was

focal for testers to look at things as a whole and see the connections between them. One participant stated *"Often as a developer, you receive a task and you do it. They are not very involved in the entire process. I think it's more exciting to be involved in both the functional and technical aspects, not just super-technical"*. Another said *"One should be somewhat technical proficient, but that is not most important. The most important part is that you need to be able to make sense of which part of the system is prone to bugs"*.

All participants mentioned the importance of being friendly and providing constructive feedback to other members, since testers are often the bearers of bad news. Constructive feedback somehow mitigates negative dynamics between testers and colleagues in the team. For example, one participant mentioned that *"I was on a project few years back where I sat next to the developers. When I found a bug, I stood up and walked towards them with a friendly smile"*. Another explained that he gave explanations on what went wrong and did not focus on whose fault it was. A third mentioned that *"Whenever I find a bug, I go to the developer in mind and ask him if it's suppose to be like that. I try not to point any fingers because that's never pleasant for anyone and it's not appreciated"*. We observed that testers were thorough with the way they reported bugs in meetings by the respective digital task board, one participant was particularly thorough with describing what went wrong, the expected result and actual result, and the steps he took to reproduce it.

Lastly, participants mentioned that their motivation during work was triggered by continually learning something new, having fun with pleasant co-workers, and performing enjoyable yet challenging tasks. One participant, when asked what he liked about his job, stated *"Lots of things motivate me during work; cool projects, challenging workdays - those that one actually has to use the head - and also working with lots of different people, which is always fun"* Another mentioned *"It's fun to work in a team, and work together with others. When I have issues, there's a high probability someone else on the team has the solution. Sometimes I'm the one that helps them. I think it's really cool to work this way, and it becomes a lot more social during work - I look forward to work every day"*.

4 LESSONS LEARNED AND IMPLICATIONS

Based on the current results, being creative and structured are the most important traits for a tester to possess. Burnstein [4] also suggests that testers need to be creative and experiment-oriented, while Kanij et al. [11] found that software testers tended to be more organized, disciplined, and hard-working.

Communication skills are especially important for software testers [6], and reporting faults in a constructive way is advisable in order to foster a synergized work environment. Ahmed et al. [1] described software testers as "the software development team's worst enemy" and therefore they need good interpersonal skills. A recent study shows that people are more careful in their communication if a conflict is thought to occur [9]. Software testers need to communicate in a way that does not provoke conflict within the team. It was noted that two of the testers became friends with the rest of the team, to the point where the team began to socialize during off-work hours. They stated that it became easier to ask for help and seek feedback after the get-togethers. Psychological safety has been found to improve team performance in agile projects [10], and making software testers less worried about offending developers when confronting them with bugs [14]. Current findings add to the understanding that psychological safety is important and may occur through social interactions among team members.

We found curiosity and the ability to see totality as important traits for testers. A recent study on the skills of software testers also found that testers need to have both broad views and attention to detail [7]. Two existing studies focused on motivational factors for testers [5, 13], found that enjoying challenges and having work variety were included in the motivational factors - our current findings suggest confirming this. Some of the traits we discovered as essential for software testers, such as the ability to engage with others, having decision-making skills, and eagerness-to-learn has also been identified as important for software developers [12]. Future work could further investigate differences and similarities in traits, as well as how the degree of importance varies, for people having these two types of roles.

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