

Testing Distributed and Heterogeneous Systems: A State of the Practice Survey



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Distributed and Heterogeneous Systems

In the context of this survey we define a Distributed and Heterogeneous System (DHS) as a set of small independent systems that together form a new distributed system, combining hardware components and software system, possibly involving mobile and cloud-based platforms.

Research Goal

The main goal of this work is to explore the testing of DHS from the point of view of industry practitioners, in order to assess the current state of the practice and identify opportunities and priorities for research and innovation initiatives.

Survey Distribution

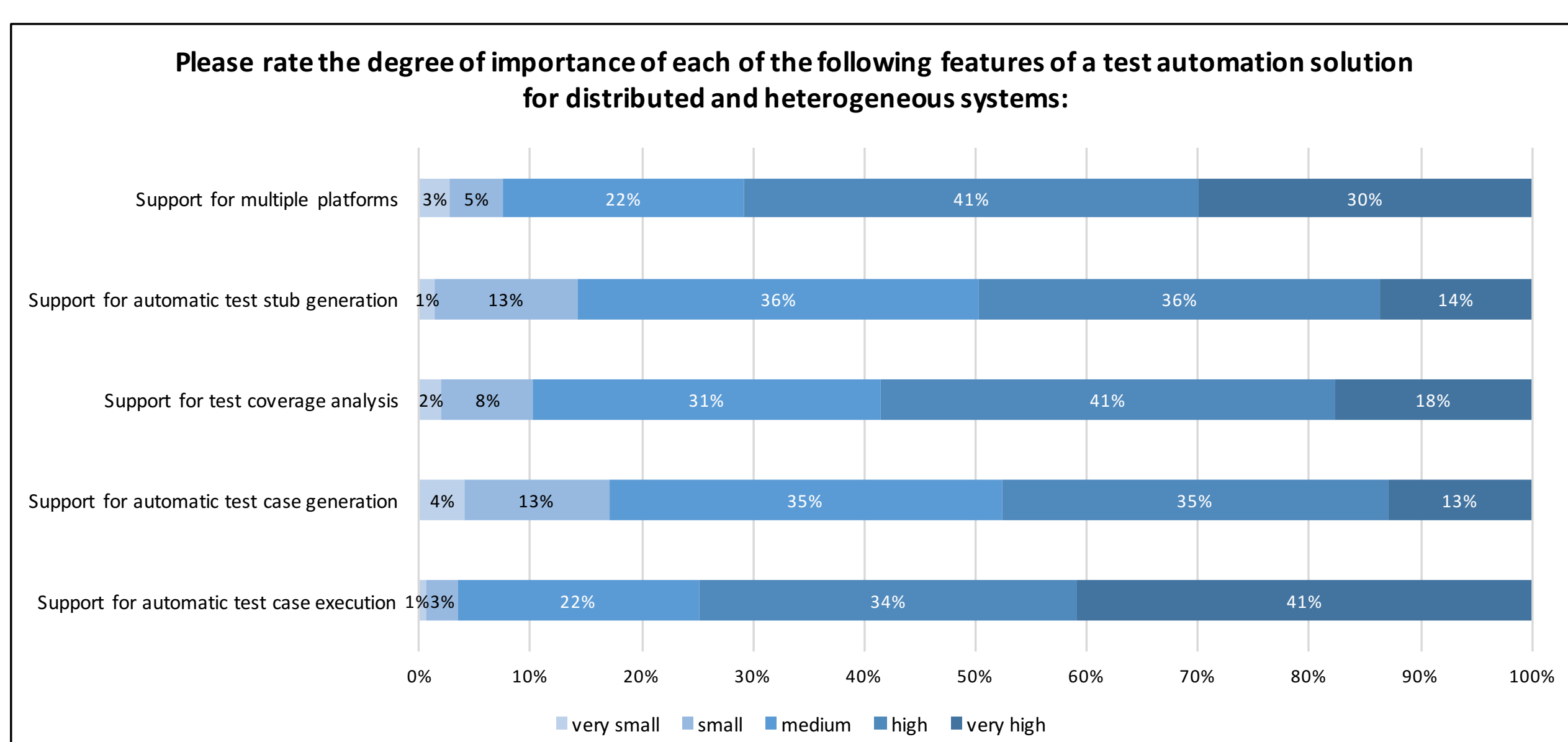
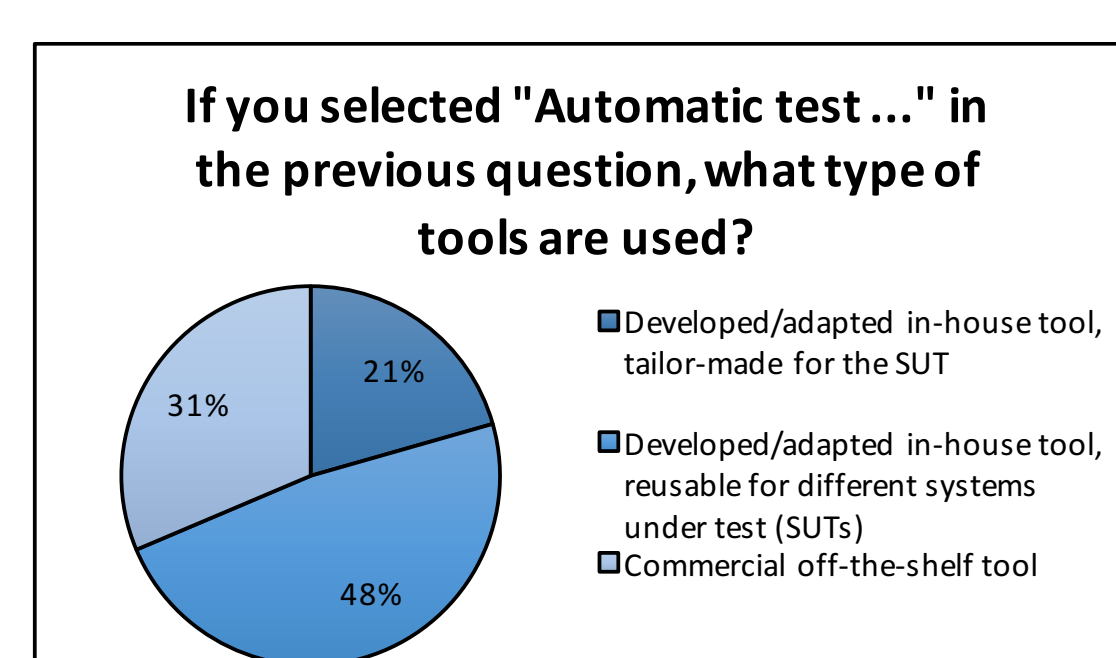
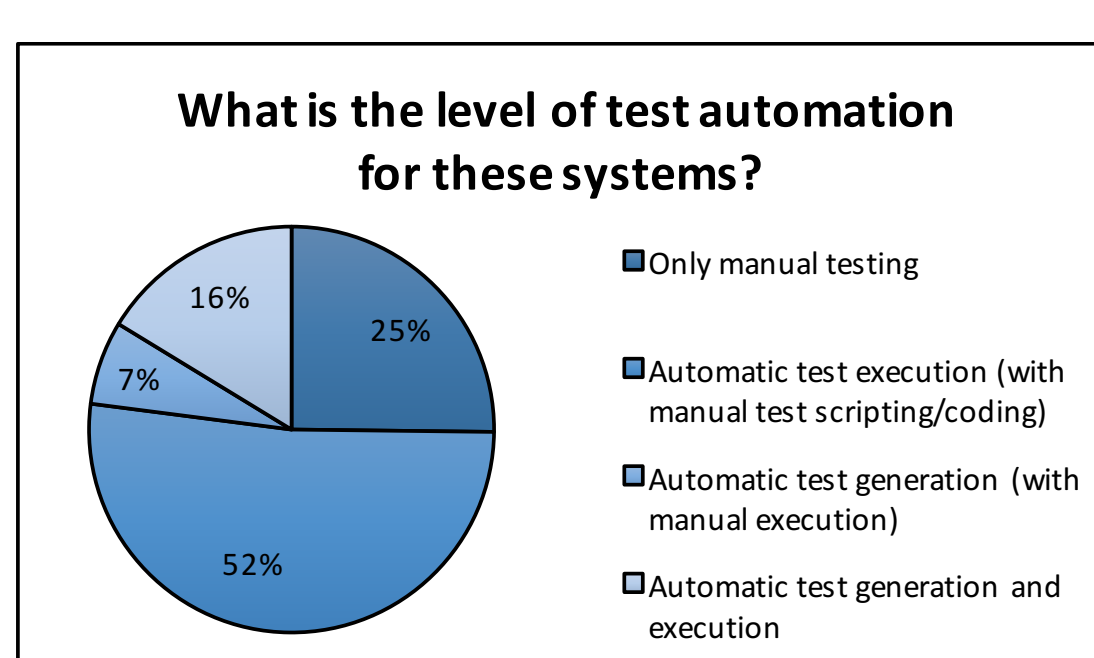
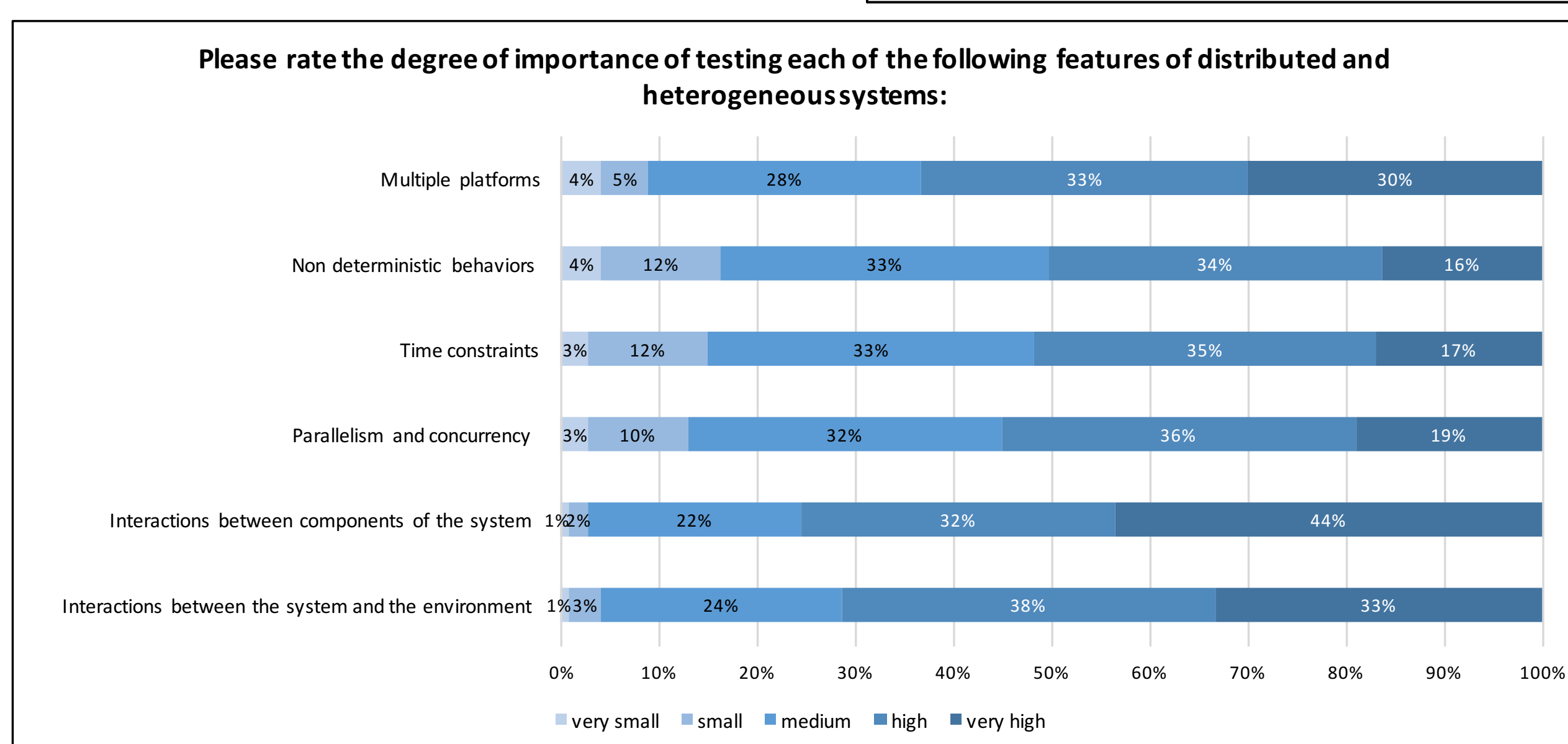
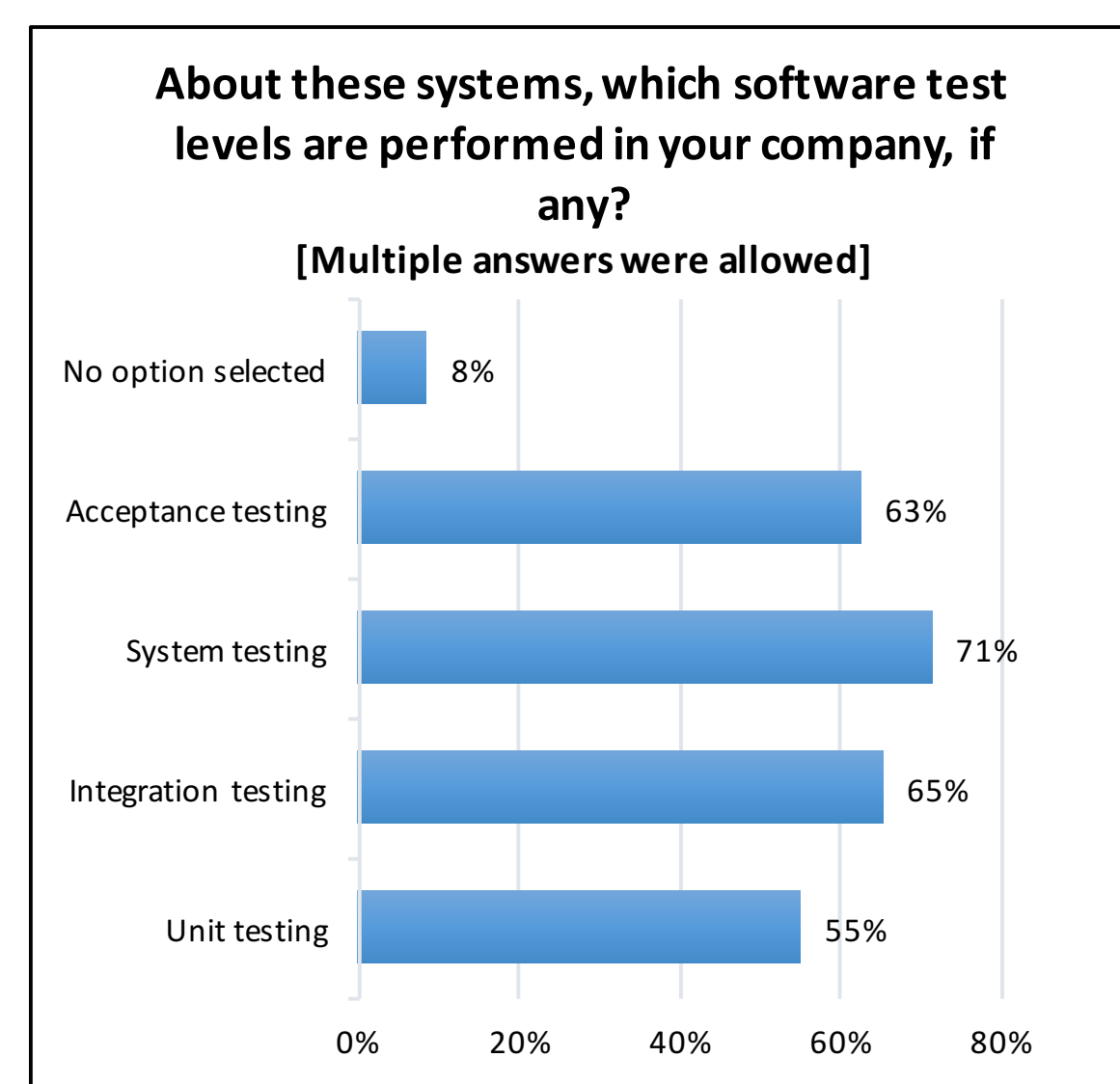
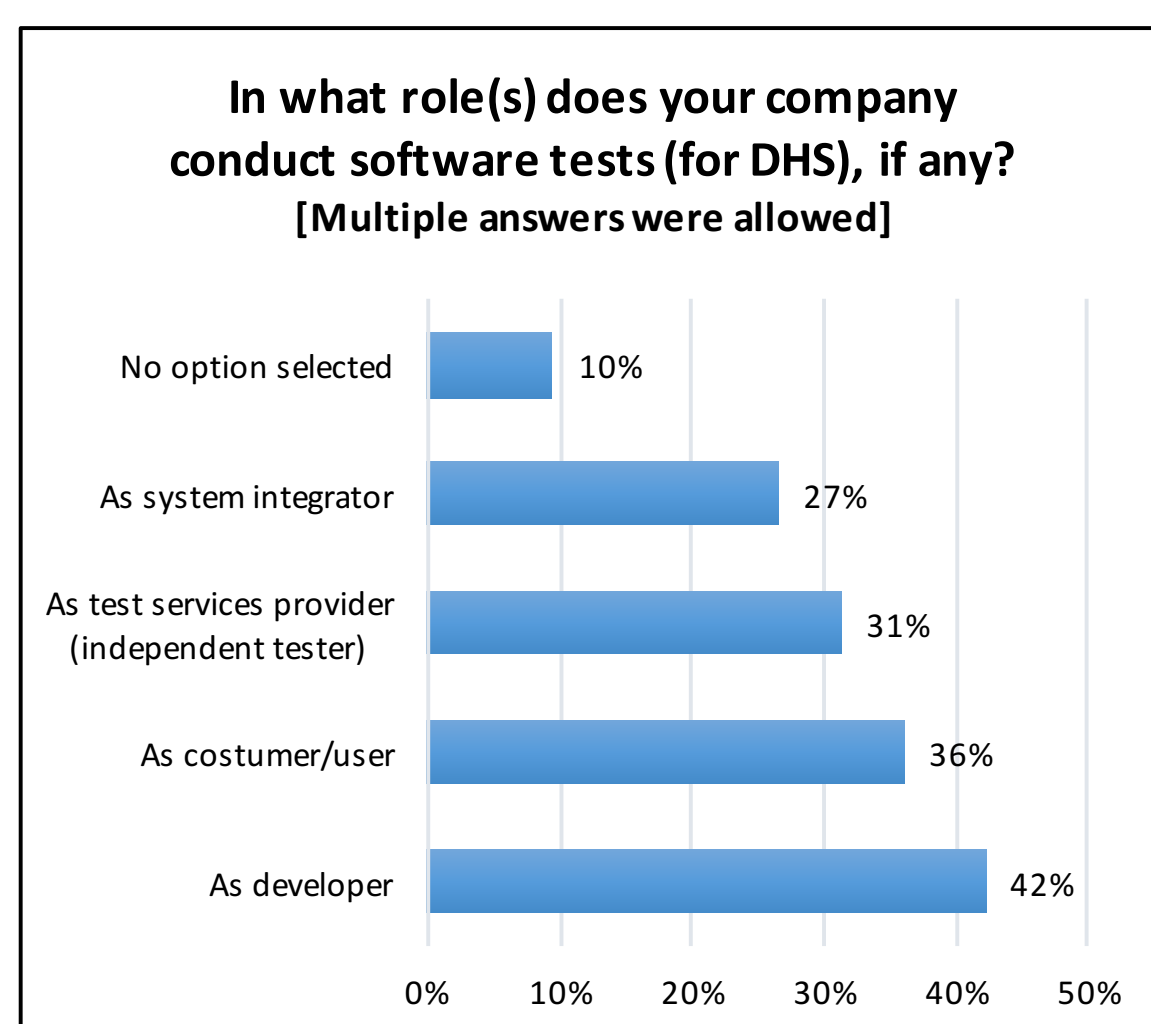
We shared the survey to the participants of two industry-oriented conferences in the software testing area:

TESTING Portugal 2015

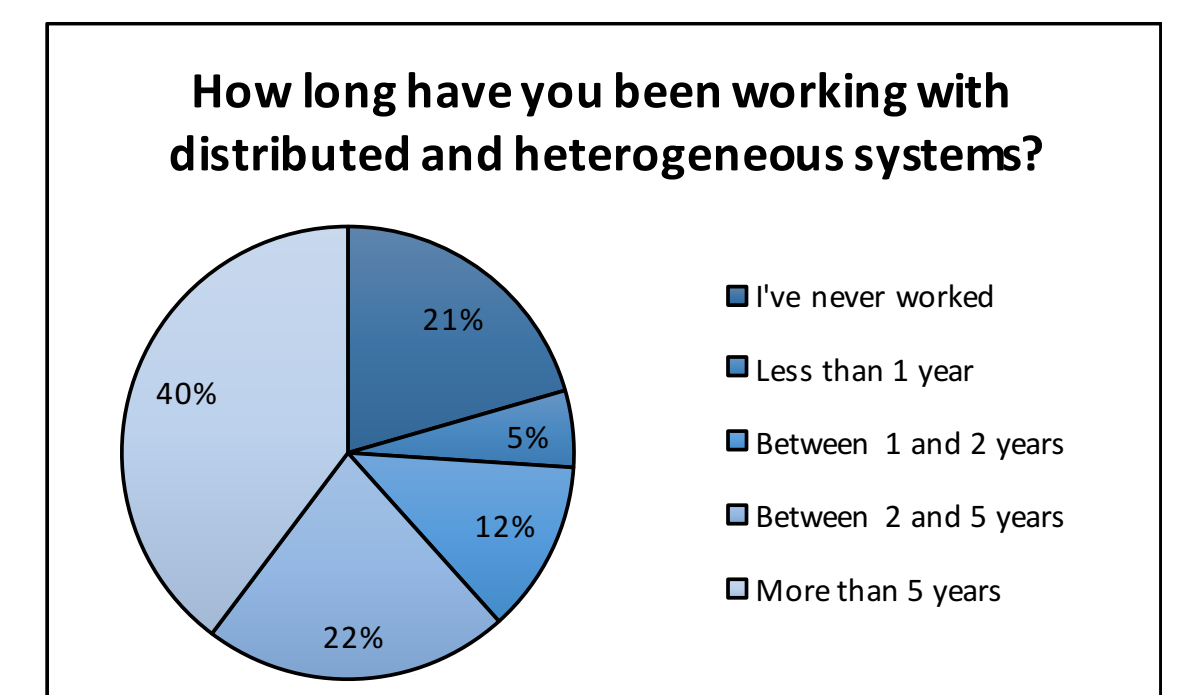
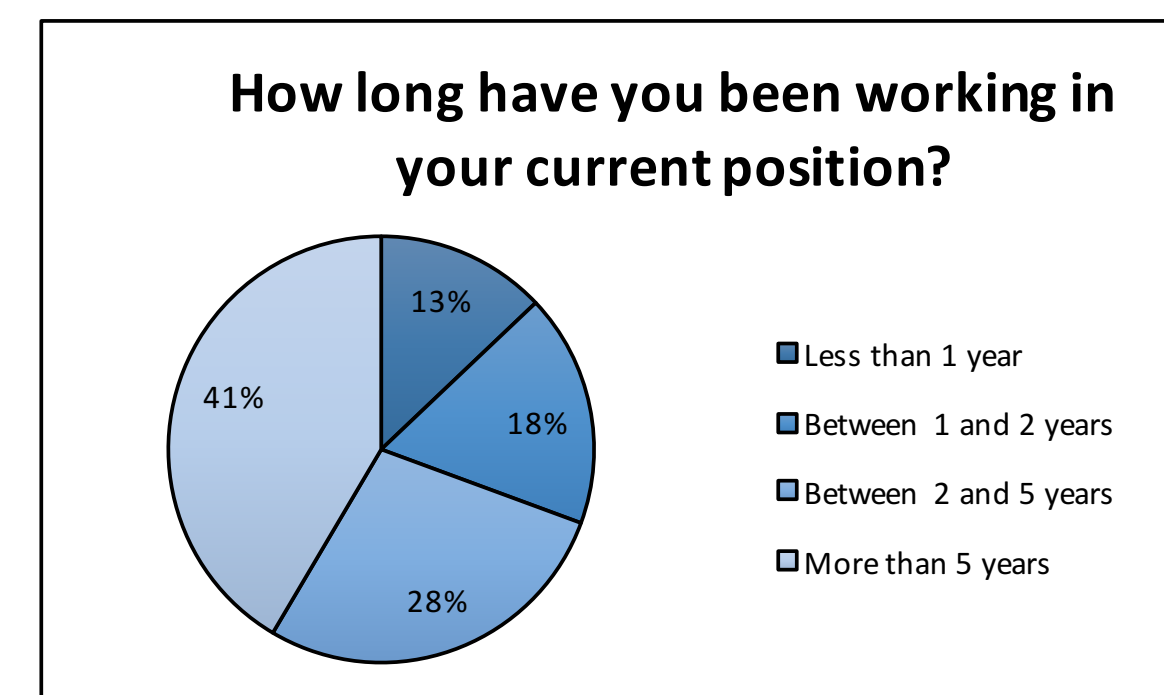
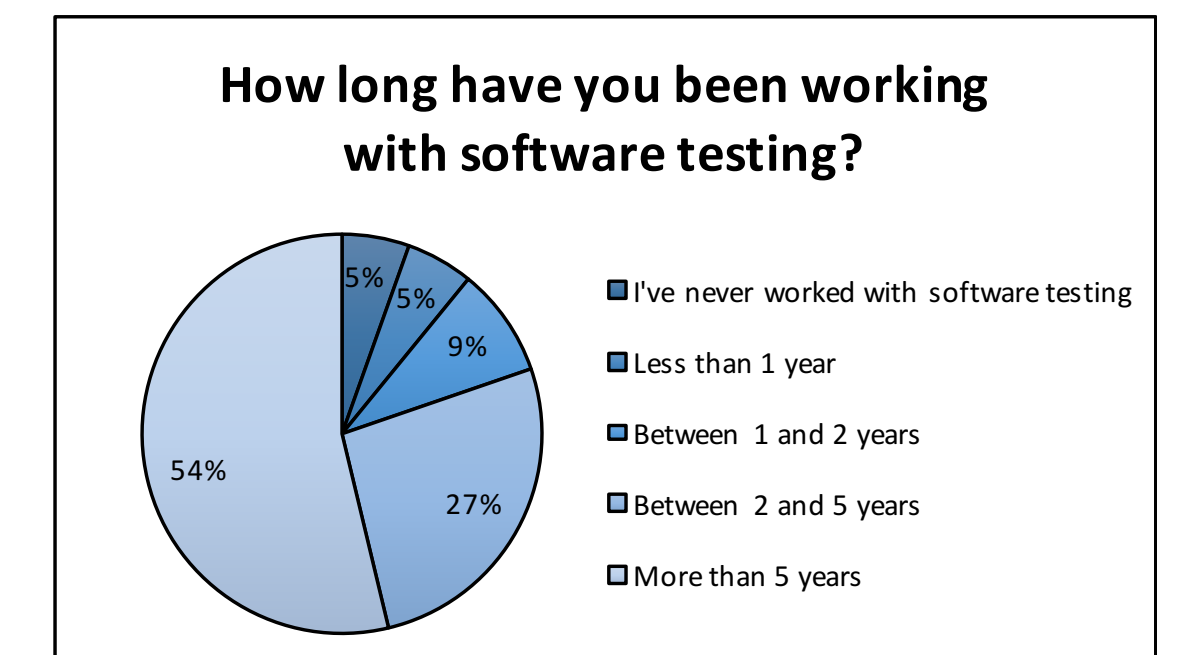
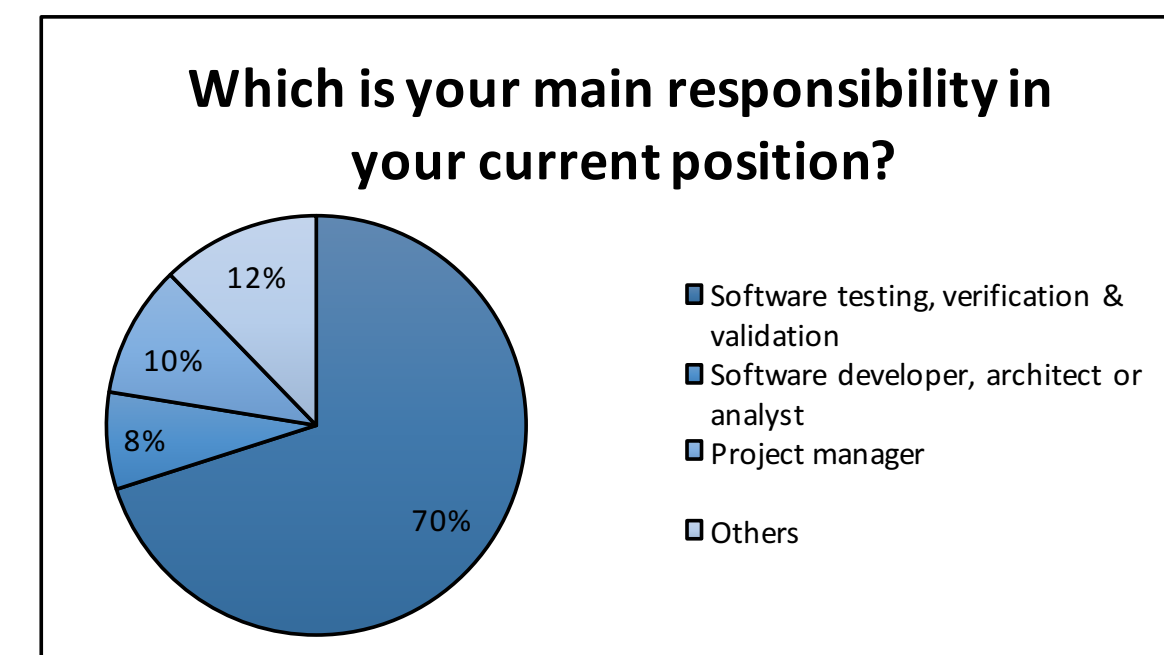
User Conference on Advanced Automated Testing (UCAAT) 2015

In total we distributed 250 surveys and we obtained 147 complete and valid answers.

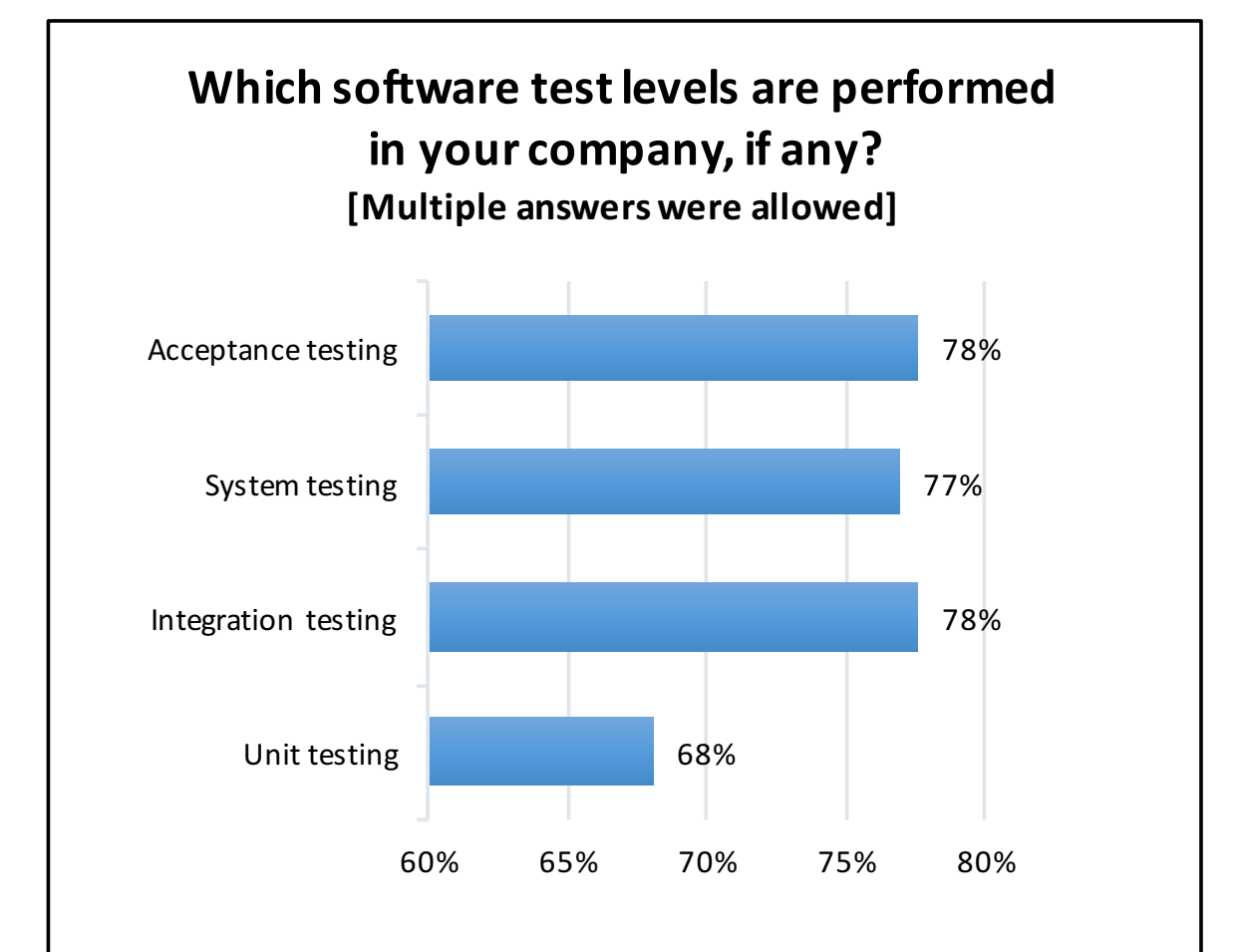
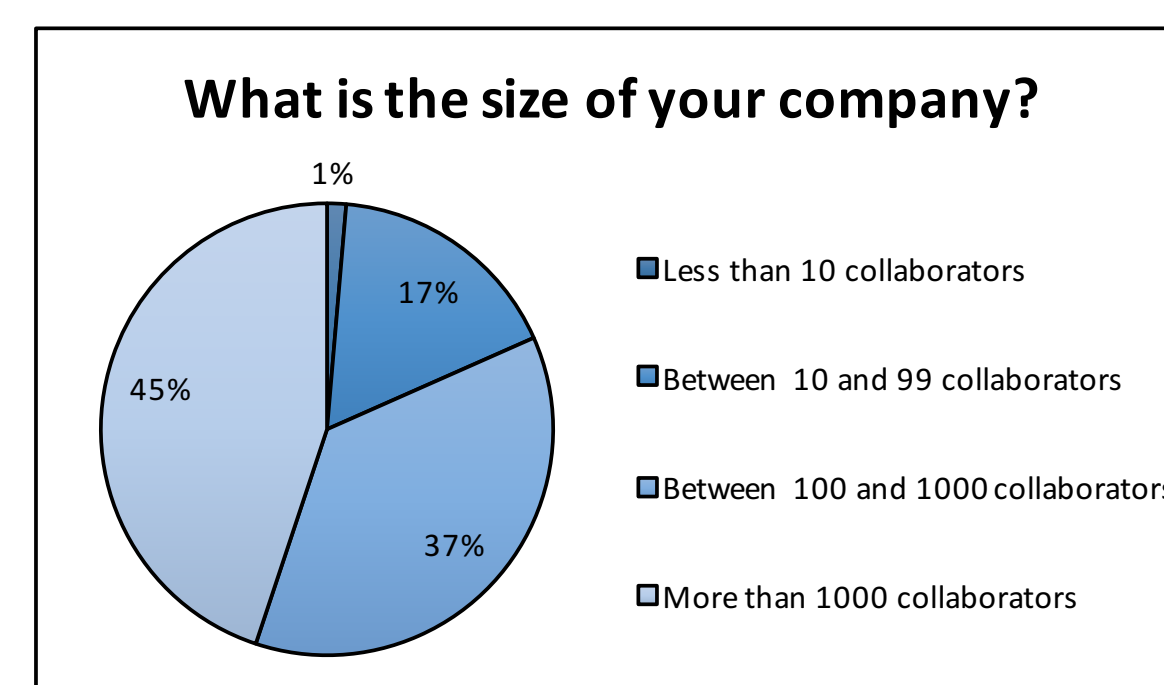
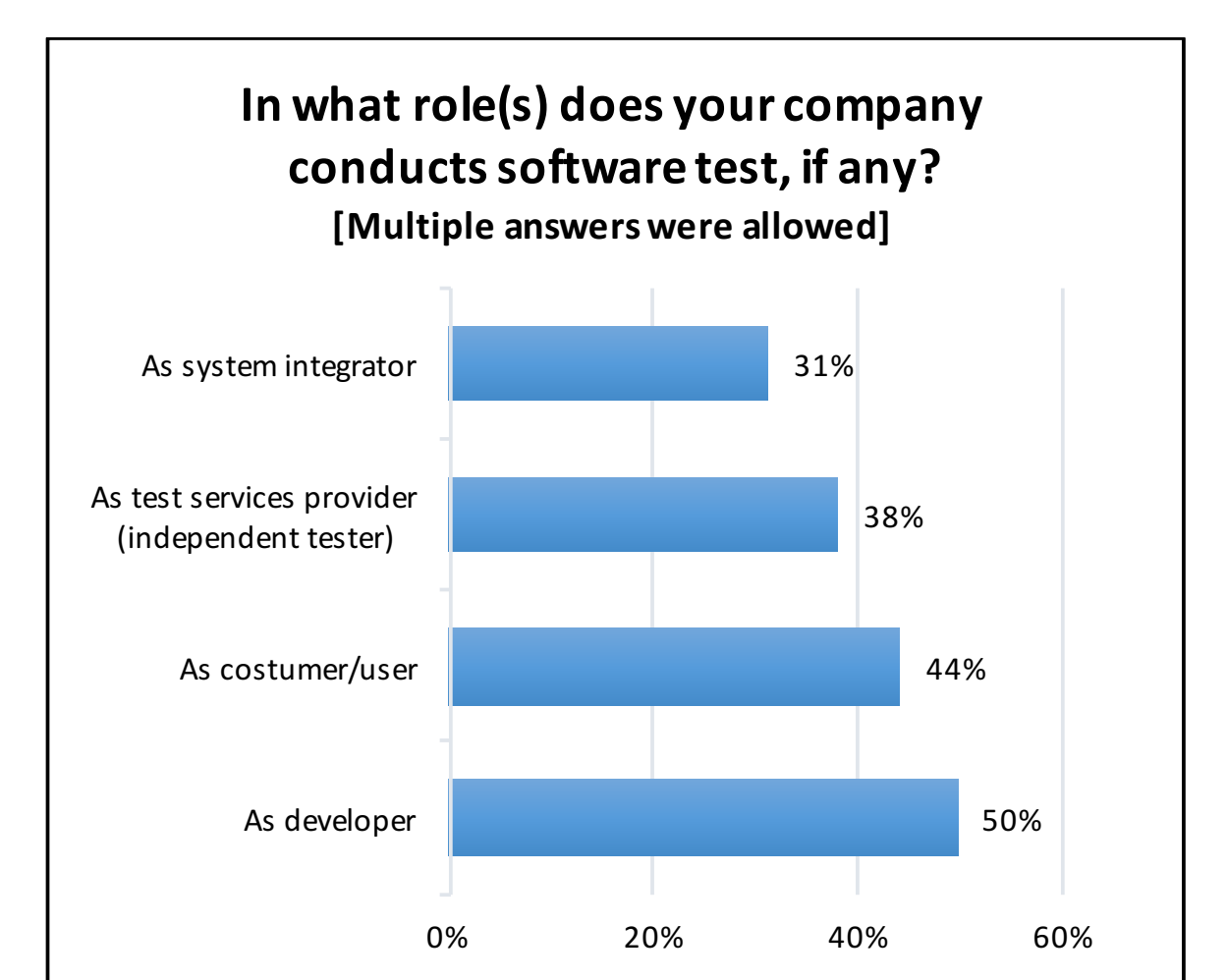
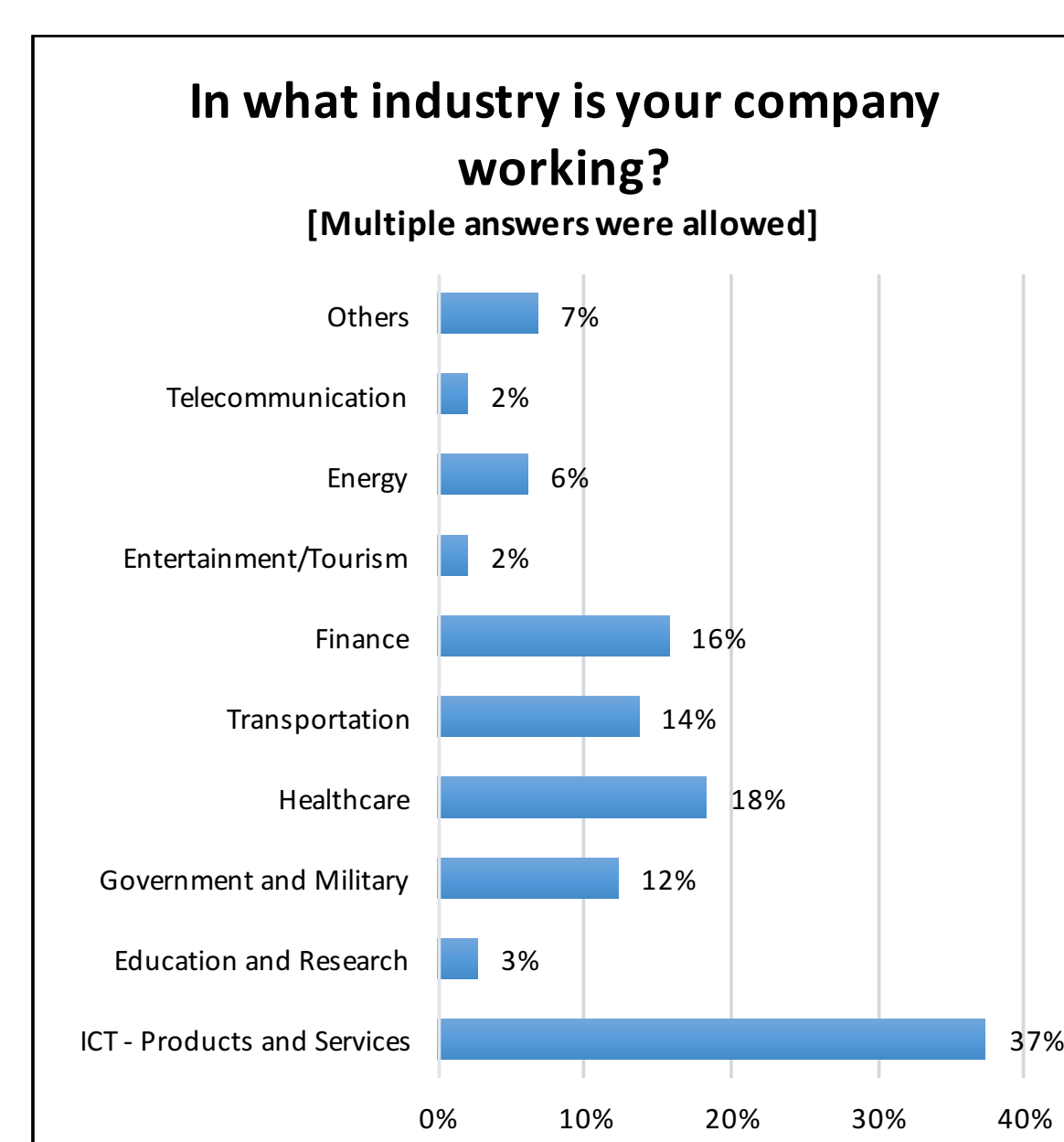
Distributed and Heterogeneous Systems Testing



Participants Characterization



Companies Characterization



Research Questions

RQ1: How relevant are DHS in the software testing practice?

A vast majority of approximately 90% of the companies surveyed (all with software testing activities in general) conducts tests for DHS, in at least one role and at least one test level, hence confirming the high relevance of DHS in software testing practice.

RQ2: What are the most important features to be tested in DHS?

'Interactions between components of the system', followed by 'Interactions between the system and the environment'

RQ3: What is the current status of test automation and tool sourcing for testing DHS?

The current level of test automation for DHS is still very low, and there is large room for improvement, since 25% of companies in the survey claim that they only perform manual tests, against only 16% who claim to test DHS with a full automatic process.

If we look for companies that have some type of automation in its testing process, we realize that the automation process is requiring a high effort in the creation / adaptation of own tools, because only 31% of companies claim to use a commercial tool to test these types of systems.

RQ3: What are the most desired features in test automation solutions for DHS?

Regarding the conclusions that can be drawn for future work, particularly at the level of creating tools that can reduce the effort required to test DHS, we realize that companies identify as key aspects of a tool to test such systems the ability to automate test execution and the support for multiple platforms.

The comparison of the degree of importance attributed to automatic test case execution with the current status, shows that there is a significant gap yet to be filled between the current status and the desired status of automatic test case execution.