

GUI-based Testing in the Brazilian Software Industry: A Survey

1st User Interface Test Automation – INTUITEST 2015

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Sophia Antipolis, France Oct.19 2015

Agenda

- Introduction and Conceptual Aspects
 - Software Testing;
 - GUI (*Graphical User Interface*) testing (GUI-based testing);
 - GUI testing generations;
 - Survey and Research questions.
- Survey Design and Execution
 - Arrangements and questionnaire.
- Survey Results
 - *Research Questions* (RQs);
 - Answers to RQs.
- Result Discussion and Final Remarks
 - Discussion;
 - Threats to Validity;
 - Conclusion.

Software Testing

- Software Testing
 - Product versus Specifications;
 - Software quality and productiveness;
 - System testing \Rightarrow GUI testing;
 - Testing vs cost vs success.

- Brazil
 - Emergent country;
 - Representative local software industry;
 - Poorly represented in international scenarios;
 - Need for academic initiatives.

GUI-based testing

- Graphical User Interface (GUI) \Leftrightarrow front-end with users;
- GUI state 3-tuple: $\{\mathbf{W}, \mathbf{P}, \mathbf{V}\}$;
- GUI testing \Rightarrow front-end resources to exercise a Software Under Test (SUT);
- Test cases \Leftrightarrow sequences of input events;
- Gaps on GUI testing:
 - lack of proper tools;
 - maintenance of testing scripts;
 - manual efforts;
 - generation of useless test cases;
 - effective test oracles.

GUI testing generations

More than 24 years of GUI testing!

- G1:
 - Scripted;
 - Record/playback tools;
 - Maintenance issues.
- G2:
 - Component-based generation;
 - Mapping events and interactions;
 - Ripper/script-dependency.
- G3:
 - Visual GUI Testing (VGT);
 - Image recognition algorithms;
 - Robustness problems.

Survey

- Insights on the practice and needs of GUI testing in Brazil;
- Quantitative data to support:
 - ideas and initiatives.
- Research Questions:
 - RQ1: Do the practitioners from the Brazilian software industry know all of the GUI testing concepts?
 - RQ2: What are the GUI testing strategies being applied in practice?
 - RQ3: What are the reasons to not apply GUI testing in practice?
 - RQ4: Does the Brazilian software industry implement supporting tools for GUI testing?
 - RQ5: Do the practitioners know the importance of the GUI testing for the quality of the final product?

Survey design

- 21 online questions: objectives, essays, and scale;
- Introduction on GUI testing and its generations (Generation 0);
- Questions:
 - Professionals information;
 - Testing activities (testing levels, automation, etc);
 - GUI testing practices (generations);
- Announcement: professional media and personal contacts;
- 70 practitioners (testers) of top IT companies;
- 56 responses, and 49 were selected.

Testing levels in Brazil

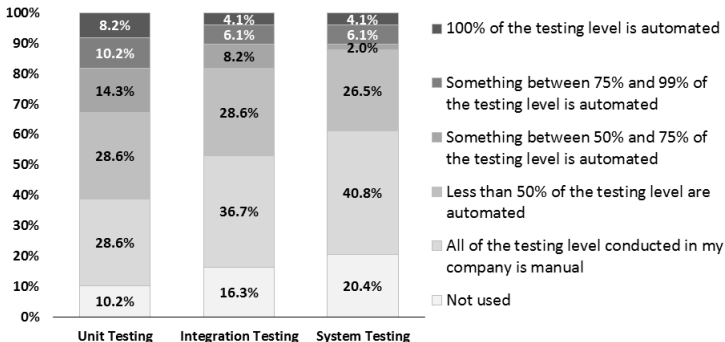


Figure: Use of each testing level and how automated they are.

GUI testing generations in BR

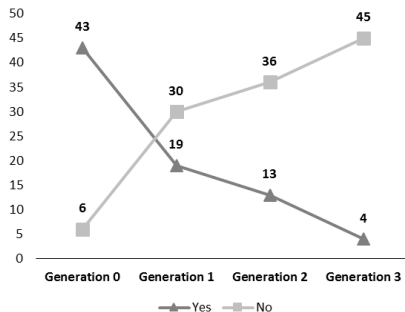
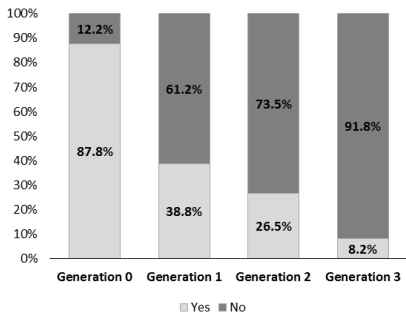


Figure: Rates and numbers: each GUI testing generations.

GUI testing – Why not?

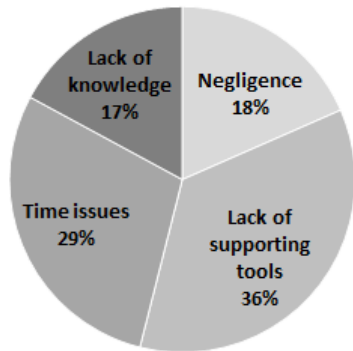


Figure: Main reasons to not apply GUI testing.

GUI testing: is it important?

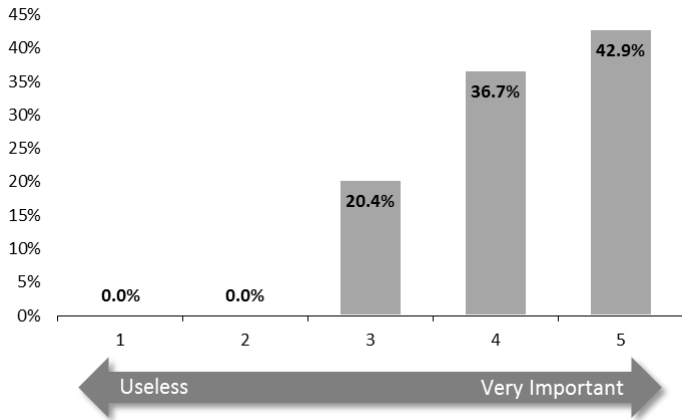


Figure: GUI testing for Brazilian IT practitioners.

GUI testing generations in BR

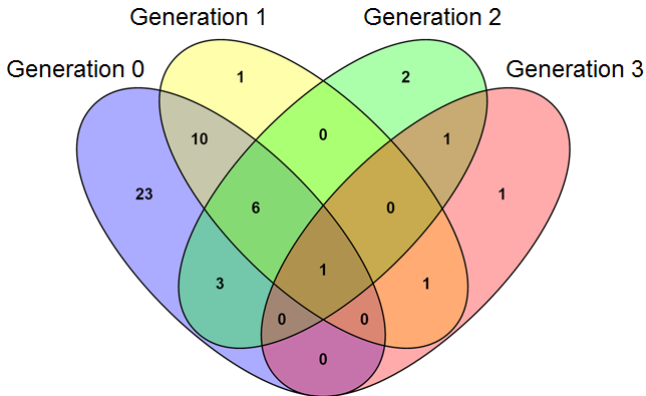


Figure: Combination of GUI testing generations.

Answers to RQs

- RQ1: only 69% had knowledge of GUI testing techniques;
- RQ2: G0 87.8%, G1 38.8%, G2 26.5%, and G3 8.2%;
- RQ3: negligence or careless is the main reason to not apply GUI testing;
- RQ4: 92% do not implement their own testing tools;
- RQ5: 42.9% considered the GUI testing very important.

Discussions

- Immaturity of GUI testing in BR;
- More combinations of G2 and G3 (Venn);
- Initiatives:
 - Cooperation academia and industry;
 - Exigency of more reliable software;
 - Incorporation of quality issues in IT courses;
 - Cooperation academia and industry;
 - Capacity programs for practitioners.

Threats to Validity

- Credibility:
 - Participants: testers and practitioners (developers and managers);
- Dependability:
 - open questions can bring inconsistencies;
- Confirmability:
 - previous knowledge on GUI testing.

Conclusion

- Contributions:
 - (1) this study produces insights for future directions on the practice of GUI testing strategies;
 - (2) we present an effective analysis questionnaire that can be adapted and applied in other countries under different contexts;
 - 3) we provide a massive discussion with critical points of view and comments on what is expected from the GUI testing in the software industry of an emergent country.
- Future work:
 - Wider scenarios (comparison among countries);
 - Categorize practitioners.

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