

Cost Benefits for Test Automation

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Key points attendees take away:

- Costs and benefits from test automation are both tangible and intangible
- Categories of costs and benefits associated with test automation
- Methods of computing costs of automation
- Methods of computing benefits from automation
- Views of the analysis of cost benefits
- Examples from experience of cost benefit computations and analysis

Abstract:

There are many factors to consider when planning for test automation. Automation changes the complexion of testing from design through implementation and test execution. It is important to understand the potential costs and benefits before undertaking the kind of change automation implies. Automated tests may reduce staff involvement and durations during testing, thus saving some in relation to manually running the same tests. However, automated tests can generate mountains of results that may require more staff involvement for analysis. Often the information obtained from automated tests is more cryptic and it takes more time to analyze and isolate faults when they are discovered. Yet, some information may only be available because of the automation. This presentation describes financial, organizational, and test effectiveness impacts observed when software test automation is installed. Suggestions and examples to help decide when automation is beneficial are included.

Cost benefits from automation can be viewed as trade-offs in comparison to manual testing (or our current situation). There are some costs and benefits, however, that only relate to automated testing, especially when comparing test effectiveness. Where financial values can be compared there are simple ways to decide about automation. More difficulty is encountered when comparing organizational changes, and comparing test effectiveness is confounded by additional factors.

Financial impacts can be computed in comparison to two alternatives: manually testing the same thing or not testing (accepting the risk of not knowing). The first alternative is straightforward to compute when comparing the same test exercise. It often becomes tricky because the automated test does not do the same thing and may be more or less expensive to create and maintain. In

many situations automated tests have costs associated with them associated with new abilities to exercise and analyze the software under test. This means we are comparing automation costs with the benefits of reduced risk.

Organizational impacts include such things as the skills needed to design and implement automated tests, automation tools, and automation environments. Developing and maintaining automation tools and environments increases investments when compared to manually testing. Development and maintenance of automated tests is quite different from manual tests. The job skills change, test approaches change, and testing itself changes when automation is installed. Automation has the potential for changing the product being tested and the processes used for development and release. These impacts have positive and negative components that must be considered.

Existing metrics techniques such as code coverage can be used to estimate or compute test effectiveness before and after automation. Automated tests can be incredibly effective, giving more coverage and new visibility into the software under test. However, it often provides us with opportunities for testing in ways impractical or impossible for manual testing, yet conventional metrics may not show any improvements. Automated tests can generate millions of events and sequences limited only by the machine power and time available for running the tests. These tests can find defects in code already 100% covered. Employing random numbers allows sampling of events and sequences, and also allows fresh tests doing new things every time they are run. Automated probes can look inside the product being tested at such things as intermediate results, memory contents, and internal program states to determine if the product is behaving as expected.

Conclusion

Test automation is not always necessary or appropriate. Automating existing manual tests is a path frequently chosen by default, but usually is not cost beneficial and sometimes results in decreased test effectiveness. The costs and benefits of test automation can be identified and estimated, and good management decisions made about using automation to improve testing.

Experience and qualifications:

Douglas Hoffman has fifteen years experience in creating and transforming software quality and development groups, and twenty years of management experience. He has been a participant at dozens of software quality conferences and has been Program Chairman for several international conferences on software quality. He has architected test automation environments for several commercial systems and software companies, and has been an active participant in the Los Altos Workshops on Software Testing (LAWST).

He is an independent consultant with Software Quality Methods, LLC. He has been in the software engineering and quality assurance fields for over 25 years and now teaches courses and consults with Silicon Valley companies in strategic and tactical planning for software development and software quality. He has been elected Chairman of the Santa Clara Valley Software Quality Association (SSQA) five times. He is active as a Senior Member in the ASQ,

participating in the Software Division, the Software Quality Task Group, and the ISO 9000 Task Group, and is also a member of the ACM and IEEE. He has earned an MBA, a MS in Electrical Engineering, a BA in Computer Science, was among the first to earn a Certificate from ASQ in Software Quality Engineering, and has been a registered ISO 9000 Lead Auditor.