A Conformiq White Paper

Transforming to a New Age of Software Testing

Enterprise IT software is extremely complex, quickly developed by highly skilled people across the world through collaboration and must run in many ecosystems and on many devices, uninterrupted. In the past, software might be released a couple of times per year, but now, new releases may go out once each minute, seamlessly. In many cases the software development process started with a waterfall methodology, and has now moved to agile, lean, and continuous integration (CI). In this new age, cloud service consumers (software users) live in a multi-tenant world in which they no longer have control over when updates occur. Customers are scattered across many time zones and each customer must access the software, so there is never a good time for maintenance, or timeouts, or failure.
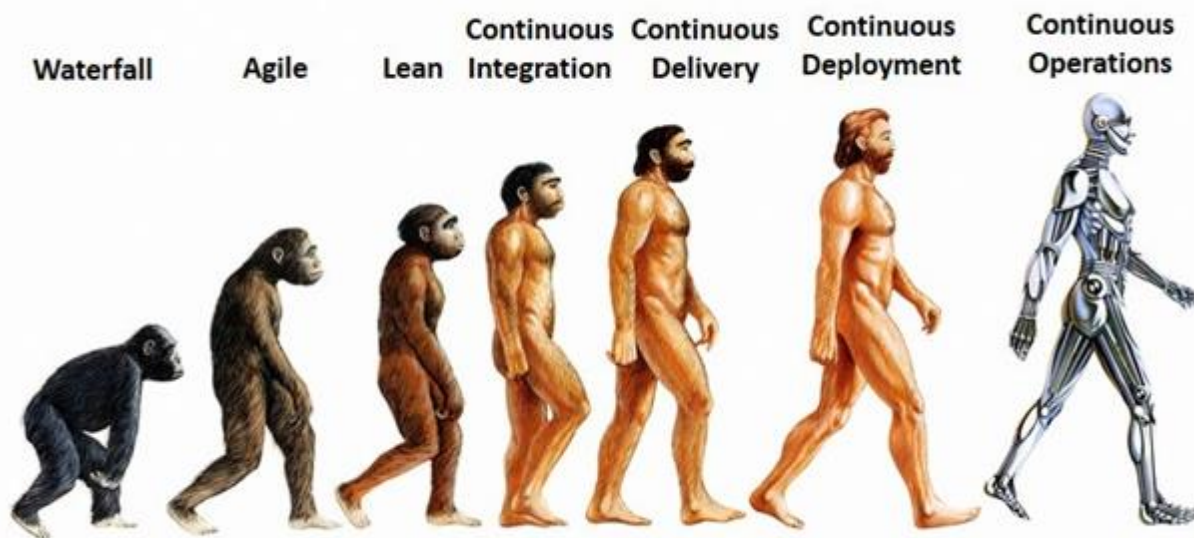
Continuous operations manage software and hardware changes in a way that is non-disruptive to software users. Even though software and servers may be taken offline during planned maintenance or updates, this is managed so users continue to be serviced by existing versions of the application, and are automatically switched over to newer versions once they have been deployed and successfully smoke-tested.

<u>A New Age in Software Testing</u>

Ensuring the quality of these highly sophisticated and dynamic software products is becoming extremely difficult at the speed of development, delivery, deployment and operations. In the New Age, software testing is a multi-dimensional approach, and a quality/test engineer always evaluates the following dimensions every minute.

Dimension:
1. Validating technical deliverables (Front-end, Middleware, Back-end, Platform).
2. Evaluating in the customer ecosystem (Web Browsers, Mobiles, Desktops, Tablets, Native, Hybrid, Cross Platform, Wearables, Operating Systems, Various Versions).
3. Increase speed of testing to match the speed of delivery through continuous integration/ delivery/ production through maximum automation.
4. Achieve full coverage by doing various types of testing (User Behavior, Functional, Performance, Security, Usability, etc.)
5. Evaluate as per the needs of the end user, product owner, product manager, developers, architects, business analysts, DevOps manager.
6. Optimize test design through high end test Design techniques (Risk based, requirements based, Combinatorial, Scenario based, Model based, Pairwise , Combinatorial, Orthogonal , Boundary values, etc.)
7. Reuse maximum assets of other phases of the test life cycle and reuse maximum legacy assets especially from business analysts/product owners/developers/architects/developers/other testers

In the New Age, test engineers wear many hats in software delivery, and he/she needs 360° transformational software testing support, including test automation and integration with a variety of solutions/techniques, to deliver his/her multi-dimensional work.

Conformiq 360° **Test Automation** is transforming the testing process from the inside using unprecedented state-of-the-art technology. With Conformiq next-generation testing solutions, test design and testing efforts are significantly optimized, while testing quality is increased.

In the New Age, testing is not just about automating test design, or any other single part of the testing process. Instead, it's about automating how the tests are derived and designed in the first place, as well as how tests are managed and executed. It's about transparency, visibility and control. It's about speed and turnaround time. It's about seamless integration; bringing tools and processes together.

Conformiq 360° - A Total Testing Transformation
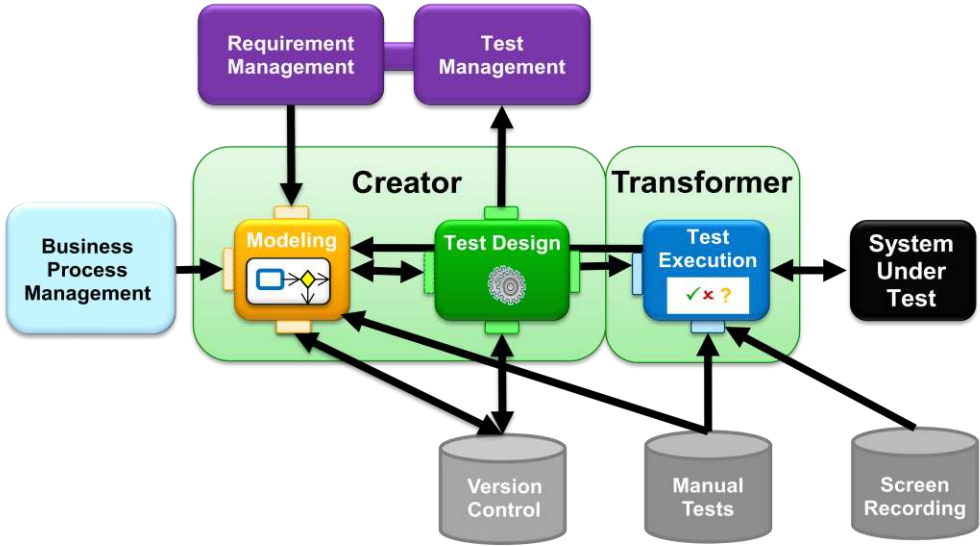
The following sections emphasize the real-world needs from software testing in the New Age:

Increased productivity:

- Automate functional testing with minimal manual involvement.
- Leverage existing test assets – test cases, requirements, prototypes.
- Eliminate test automation backlog.

Increased and optimized coverage:

- Thoroughly test complex systems with a minimum of test cases; optimize regression test suites.
- See generated tests, what they cover, and why they're needed; gain visibility into what has been tested and what has not.

Integrated test flow:

- Tightly integrate with all SDLC tools and processes.
- Directly link to automated execution frameworks.

Test automation:
- Shorten the path to test automation.
- Simplify advanced test design techniques.
- Automated execution of tests on many platforms and ecosystems.
- Parallelize testing on premise, or in the cloud.

Reusability:
- Reuse existing assets including models, manual test cases, and record and playback tests.
- Reuse every stakeholder's assets to quicken the delivery.
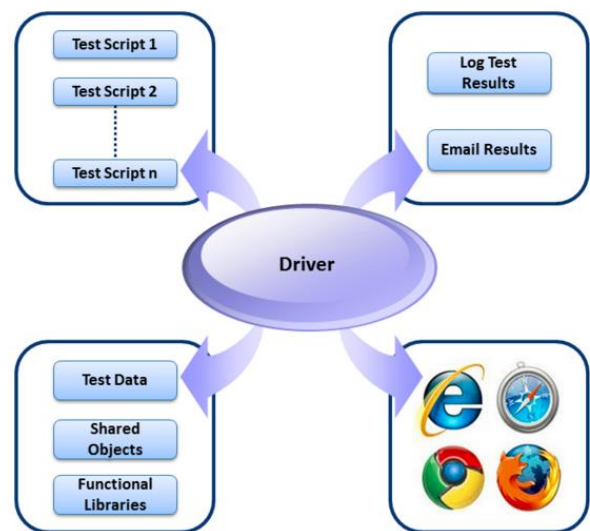
Test Automation

Testing at the speed of development is becoming extremely crucial to release software. **Automated tests are the only way to achieve sufficiently high test coverage in each sprint** and thus provide the high quality and rapid feedback that testers seek for their projects.

The benefits of automation are various. The time saved when executing tests automatically instead of manually is an obvious advantage. Another is that test automation can lead to more exhaustive testing because with automation, nothing stops testers from executing the same test several times with more varied test data and perhaps even test different environments. However, the main benefit of test automation is that confidence in the system and its quality are increased when more comprehensive tests are performed. This trust makes it possible to improve and customize the system to project requirements.

Additionally, resources become available for other tasks. Instead of retesting existing functionality, testers can put their energy into testing areas of new functionality where human insights are really needed. Developers also become more confident with the help of automation. There will be fewer errors left as developers quickly see the consequences of a code change, thus saving the team's (and their organization's) time and money!

Test Automation Framework

A **test automation framework** is scaffolding that is laid to provide an execution environment for the automation test scripts. A framework is a constructive blend of various guidelines, coding standards, concepts, processes, practices, project hierarchies, modularity, reporting mechanism, test data injections etc. to pillar automation testing. Thus, users can follow these guidelines while automating applications to take advantage of various productive results.

Framework Architecture

At a high level, an automation framework uses drivers and data sets to execute tests in a variety of test environments.

The best framework is an amalgam of many test automation techniques, taking advantage of their strong points and intelligently tackling their weaknesses to satisfy the needs of various kinds of project stakeholders.

Highly-used test automation framework types:

1. Module-based testing framework.
2. Library architecture testing framework.
3. Data-driven testing framework.
4. Keyword-driven testing framework.
5. Hybrid testing framework.
6. Behavior-driven development framework (BDD).
7. Business process testing framework.

Advantages of test automation frameworks:

1. Reusability of code.
2. Maximum coverage.
3. Recovery scenario.
4. Low cost maintenance.
5. Minimal manual intervention.
6. Easy reporting.

Conformiq Transformer

Conformiq Transformer is an automation framework, part of Conformiq's 360° platform. Transformer has been designed to drastically speed up, simplify and automate test execution for testing professionals with little or no programming experience and background. It covers all aspects of transforming either manual or generated tests into automatically executable tests.

It enables easy transformation of tests from one type to another type; especially important is its' ability to convert existing manual legacy test cases into automatically- executable tests.
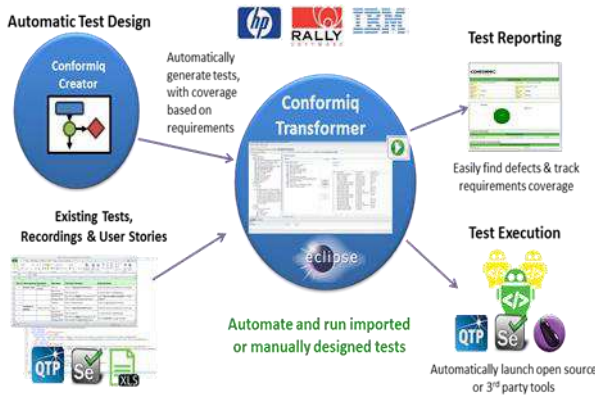
Transformer's main functionality:

- Best combination of various automation framework technologies (module, library, data-driven, keyword-driven, hybrid, and BDD).
- Transforms existing manual tests into automatically executable tests.

- Automates the execution of new and existing tests, with and without programming.
- Automates tests automatically generated from Conformiq Creator, Designer and iRise.
- Form-based test suite, test case, and keyword editors.
- Assisted keyword automation (user interface inspector, action auto-complete, import of recorded object repositories).
- Live-check of test suites.
- Automates test execution by extending industry-standard test automation tools.
- Uses existing commercial and / or open source test execution tools.
- Consolidated reports of test assets.
- Exports all the designed automated scripts to any other test automation framework.
- Collaborative platform to share the test automation projects.

Legacy Tests Transformation - Manual Tests

Conformiq Transformer takes existing or legacy manual tests in various formats from existing applications and helps in automating them with existing or new test automation frameworks (including both open-source and commercial test execution tools.) For example, manual tests described in a Microsoft Excel sheet can be reverse-engineered in Transformer.

	A	B	C	D	E	F
1	Test No	Test Case Name	Description	Step Name	Test Step Description	Expected Result
2	1	Checkout Items	Add quantity and checkout	Open Url	Enter Url "http://esd.conformiq.com"	Conformiq sample web application should open
3	1			Add items to shopping	Click on Start link	it should redirect to shopping page
4	1			Add items to shopping	Enter SKU as "CQ0001" and quantity as "2" and click on Add to shopping basket	Verify "Items are added successfully" message displayed
5	1			Checkout	Click on Checkout button	Check out page displayed with items
6	2	Invalid SKU or Quantity	Adding invalid sku	Open Url	Enter Url "http://esd.conformiq.com"	Conformiq sample web application should open
7	2			Add items to shopping	Click on Start link	it should redirect to shopping page
8	2			Add items to shopping	Enter SKU as "CQ003" and quantity as "2" and click on Add to shopping basket	Verify "Invalid SKU" message displayed

Reverse engineering the manual tests from many formats (Excel, HP/QC, Rally and more) is a preparatory step for Transformer. Transformer importer (an integrator to convert legacy tests to Transformer format) can be easily developed using Transformer APIs. Conformiq Transformer refactors imported manual tests to optimize them after importing. Users can refactor the parameter names, descriptions, and step names easily.

Library-based Framework - Reusable/Extensible Automation

Conformiq Transformer provides the ability to download Java libraries, HP/UFT functional libraries developed by automation engineers and developers so that even non-

programmers like manual testers and business analysts can design automated test scenarios and execute them in real time. Script-less, code-less automation brings great unity between non-programming testers, developers and automation engineers. Whenever a sprint starts, non-programmers like a manual test engineer, product owner, or product manager can create scenarios.
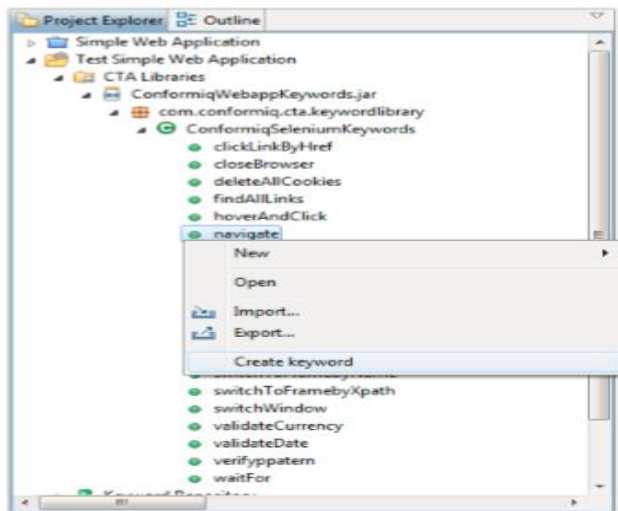

Java, the most highly utilized programming language, is supported in Transformer for the library architecture framework.

**Keyword-driven Testing - Easier Test Design**

Keyword-driven or table-driven test automation is typically an application-independent automation framework designed to process tests. These tests are developed as data tables using a keyword vocabulary that is independent of the test automation tool used to execute them. This keyword vocabulary is also very suitable for manual testing.

Conformiq Transformer differentiates between three different types of keywords: **automatic** (default), **manual**, and **library** keywords. An automatic keyword is executed by executing the automation steps specified in the respective automation tabs of the keyword. A manual keyword is not automatically executed but instead a popup dialog is shown during test execution displaying the manual steps defined in the description tab of the keyword editor and requesting the user to select a verdict. A library keyword is a special type of automatic keyword which is implemented externally, i.e., in a Conformiq Transformer (mobile, web, or other) library. Test automation can be easily done by drag and drop of keywords.
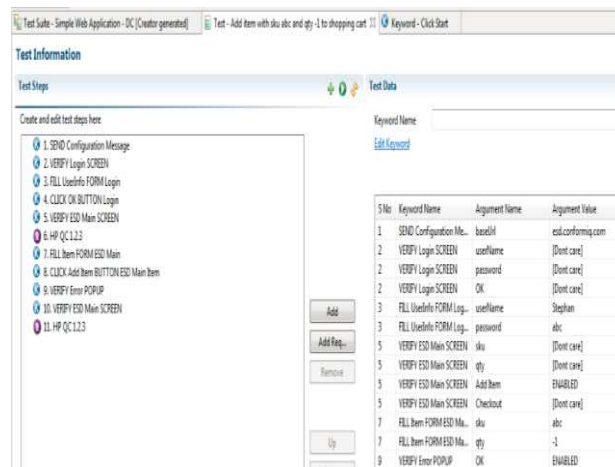
Custom Keyword Automation for External Testing Frameworks and Test Automation Tools

Every test automation team usually tries to build their own frameworks based on the platforms and product ecosystem. Test automation tools and platforms keep changing. Conformiq Transformer provides an ecosystem for users to define a keyword in any framework format in any test automation language.
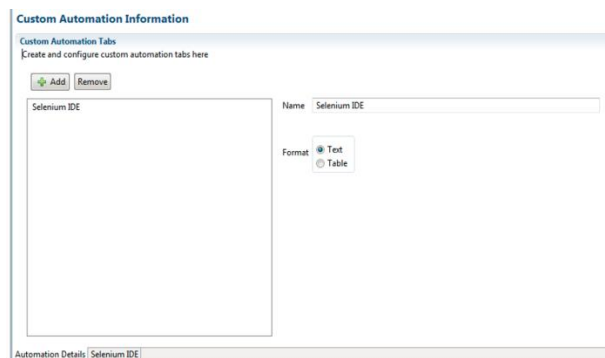
The Imported test cases can be easily transformed to any other automation technologies like Selenium IDE, HP /UFT, ExperiTest, Testplant, open source, or commercial automation tools. In this way, any kind of tabular or script based framework can be reused. Users can convert automation scripts from one framework to another either in script or tabular formats.

In the **New Age of software testing**, it is advisable to start test automation through all the transformational capabilities parallel to development. An effective automation solution like **Conformiq 360° Test Automation** with Creator and Transformer supports quicker design, maintenance, faster ramp-up time, and reusability.

Author Kalyan Kumar Talluri has been developing automated test design software for over ten years. He is a Technical Director at Conformiq in Bangalore, India.

CONFORMIQ

Conformiq is transforming software testing with Conformiq 360° Test Automation™, providing the most sophisticated and comprehensive automated test design solution in the industry. The unique Conformiq 360° Test Automation technology enables the next generation of testing: transforming, streamlining and automating even the most complex system-level testing environments. Conformiq 360° Test Automation improves efficiency with a 40% faster test case development through test execution cycle; enables delivery of higher quality code with 50% more defects found; increases manageability with 50% better collaboration: and reduces costs with a 400% return on investment. Conformiq serves enterprise IT, communications and embedded software markets worldwide. Privately-held Conformiq is headquartered in San Jose, California, with a worldwide delivery and support organization including offices in Finland, Germany, Sweden, and India.

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