Cost Savings with Test Automation
British Columbia Case Study

A look into how Aversan's Automated Test Framework (ATF) was utilized to reduce costs on British Columbia's Provincial Lab Information System (PLIS) and Interoperable Electronic Health Record (iEHR) infrastructure.

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BACKGROUND

This case study is intended to highlight how the Automated Test Framework (ATF) developed by Aversan in support of the project described below proved not only pivotal in the development and testability of the system, but also yielded a return on investment that far exceeded the cost of implementation for delivery managers conccerned with QA.

Oracle Corp. (formerly Sun Microsystems) was contracted to develop the Provincial Lab Information System (PLIS) and Interoperable Electronic Health Record (iEHR) infrastructure for the Province of British Columbia. The Provincial Laboratory Information System (PLIS) project provides consolidated diagnostic laboratory test results to authorized caregivers, across British Columbia. PLIS is a software application that supports appropriate test utilization, enhances clinical workflows, quality and utilization of laboratory services, help to support administration and management decision making and improvements in patient safety and quality of care. The Interoperable Electronic Health Record (iEHR) project helps to provide a provincial capability to facilitate the seamless, secure and timely sharing of accurate health information. Authorized healthcare professionals and their support staff across the province have access to clinical treatment information (e.g. laboratory results, drug prescriptions, etc.) about their patients irrespective of where that treatment occurred within the province.

Aversan was contracted by Oracle to provide quality assurance and release management services for the PLIS and iEHR which also consists of the Public Health Information Project (PHIP), Pharmanet, and the Health Information Access Layer (HIAL). Aversan's role is to ensure that the system meets the quality goals specified by the Ministry of Health and Oracle.

Aversan is responsible for every aspect of quality with a scope of verification that includes:

Component Verification

Integration Verification

Performance Verification

User Interface Verification

User Workflow Verification

SOLUTION

Aversan performs component, integration, performance, user interface, and workflow verification services that include the following:

- ✔ Verification that HL7 V2 Lab to Provincial Specification were being properly translated;

- ✔ Verification of HL7 V2 to V3 data conversion for every positive and negative condition;

- ✔ All HL7 V3 data was stored correctly in registries;

- ✔ All HL7 V3 data was presented to Health Care professionals correctly;

- ✔ All HL7 V3 data access transactions were logged correctly;

- ✔ On boarding of new Health Care professionals was supported; and

- ✔ All business requirements were satisfied by corresponding technical requirements as verified by a Requirements Traceability Analysis.

Aversan developed an Automated Testing Framework to support the verification and validation of the storage, retrieval, and presentation of health data to health care professionals. Component and Integration verification required an automated solution, as functional changes to the applications affect other areas of the system. After each software release, it was necessary to perform a complete regression test execution. New releases were being introduced as often as every week and the component testing of every feature at the lowest functional level was resulting in test reports that were sometimes as large as 9000 pages. Aversan ensured that report generation was a fully automated activity – this significantly increased the project development efficiency. Aversan's framework mitigates the challenges associated with component and integration testing by making very clear distinctions between services and test logic, thereby allowing script developers to focus on modeling use cases rather than having to develop a means to interact with the applications under test. The Automated Test Framework abstracted all of the various means to verify each system.

SOLUTION Cont...

Automation of the testing effort provides clear and substantial cost and time savings in the following areas:

Test Execution Throughput and Resource Management

A manual test of the PLIS and iEHR system takes an average of 1 hour. With the implementation of the Automated Testing Framework, the execution time for the complete suite of 1700 test scenarios is reduced from in excess of 40 weeks to approximately four hours. Not only does this provide a noticeable savings in execution time, allowing for full regression testing of an evolving system on a weekly basis, it frees up test personnel resources as the process is entirely automated and runs independent of user input once execution begins. As such, tests can be run with minor and major releases at nearly any time with minimal costs.

Consistency of Test Results and Test Report Creation

The reduced testing cycle time of the ATF enables weekly regression runs, enhancing overall test coverage and allowing weekly status reporting of the state of development. As total coverage of the component testing effort yielded test reports that could be as large as 9000 pages in length, the automation of test report generation proves advantageous in both consistency between weekly reports as well as time and cost savings in the generation of such reports. This expedites the identification and remediation of defects found during the development effort and provides management with total transparency of the progress of the project.

> " New releases were being introduced as often as every week and... was resulting in test reports that were sometimes as large as 9000 pages. Aversan ensured that report generation was a fully automated activity... "
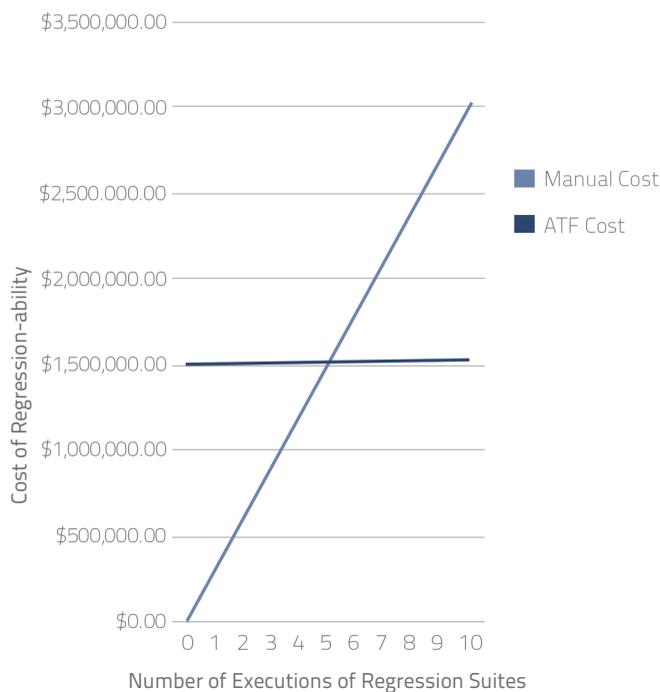
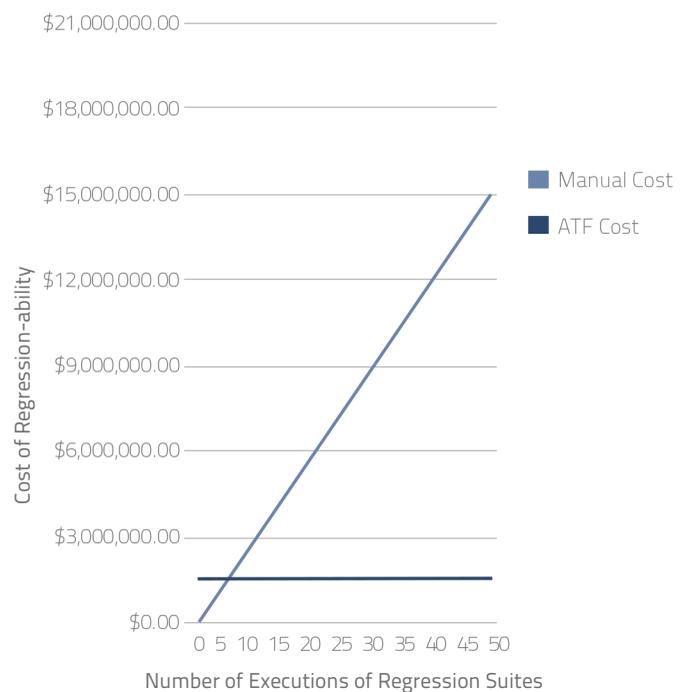# SOLUTION Cont...

Return on Investment (ROI) $\rightarrow$ $

The investment required to implement the Automated Test Framework and Regression Test Suite for PLIS and iEHR was $1,500,000.

Each major release of the system during development requires a pre- and post-candidate test confirmation run. This equates to roughly 3000 hours of manual testing for each release (as each run takes approximately 1500 man hours). Assuming a tester pay of $100/hour for manual confirmation the cost approaches $300,000 per release. Through automation of the regression suite, the cost is reduced to $2500 per run ($5000 per release). Even with a single major update per year the simple ROI is 5 years (or 5 execution cycles).

ROI on Automated Test Framework (ATF) Over 10 Test Cycles

Legend:
- Manual Cost
- ATF Cost

Y-axis: Cost of Regression-ability
X-axis: Number of Executions of Regression Suites

ROI on Automated Test Framework (ATF) Over 50 Test Cycles

Legend:
- Manual Cost
- ATF Cost

Y-axis: Cost of Regression-ability
X-axis: Number of Executions of Regression Suites

With the weekly regression requirements of the PLIS & iEHR, the chart on the right demonstrates potential annual savings over **$13 Million** through implementation of the ATF.

CONCLUSION

In summary, Aversan manages the end-to-end verification & validation programs for the British Columbia PLIS and iEHR initiatives. It was Aversan's objective to validate that the design requirements, specification, and regulations were properly addressing the needs of the province throughout the project to keep the project within scope and ensure milestones were met as planned. Aversan verified that the system's design requirements, specifications, and regulations were being implemented correctly and within the time and budget constraints.

Aversan created a sophisticated Automated Test Framework and hundreds of automated test cases composed of thousands of test scenarios that would execute and generate reports automatically without any user interaction. These tests would be executed after every major and minor release of software. This would not be possible without a sophisticated automated test framework and provided a substantial savings in the cost and time required to perform regression testing.

Aversan's testing expertise, testing rigor, and testing technology provided the leadership team with the data necessary to gain total transparency into actual progress of the development effort.

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About Aversan Inc.

Aversan is a global engineering company offering project based solutions and staff augmentation services both on and off site. Headquartered in Mississauga, Ontario, we are a leader in the engineering design and development of customized end-to-end solutions in Aerospace & Defence, Healthcare, & IT.

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