LogiGear

HALLIBURTON SUCCESSFULLY UTILIZES OFFSHORE RESOURCES IN AGILE ENVIRONMENT TO REDUCE DEFECTS BY 97%

Business Need

Landmark Graphics is a wholly owned subsidiary of Halliburton and is the premier provider of software and technology services for the upstream oil and gas industry. Their software solutions help geoscientists and engineers make highly complex technical and business decisions.

The specific product line involved in this case study is **Decision Space Nexus** - a next generation reservoir simulation software suite. The Nexus development team had been doing many things right since they started in 2001 but did not fully embrace Agile development until nearly a decade later when the team moved to a more structured Scrum environment. While the move to Scrum was not a drastic change for the Nexus team, the additional structure helped to identify a few key bottlenecks.

One of the most important lessons that the team learned on its own was the importance of having an automated regression test suite to exercise functionality under the graphical user interface.

HALLIBURTON

FAST FACTS

- INDUSTRY: Oil and Gas Exploration
- WEBSITE: www.halliburton.com
- COMPANY SIZE: 50,000+ Employees
- LOCATION: Houston, TX
- LOGIGEAR DELIVERED:

  TestArchitect™

  TestArchitect™ for Visual Studio®

  QA Training and Consulting.

  Software Testing Services QA.
- BUSINESS IMPACT:

  84% decrease in defects found in beta.

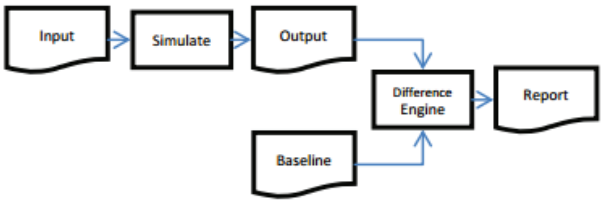
  97% reduction in issues found at product shipment.

Client Opinion

"LogiGear being available in the US time zone was invaluable for the communication required for test tool augmentation as well as any necessary testing automation reprioritization."

Todd Little - Senior Development Manager - Landmark graphics

"Automated testing is essential to landmark's ability to deliver high quality software to our customers. LogiGear's proprietary automation tool, methodology, and cost effective services play an important role in our software testing efforts."
-Nagaraj Srinivasan - Vice President Of Technology - Halliburton



While the team did not have extensive unit tests, they did have a good set of functional tests that provided overall feature coverage.

Prior to any commitment being finalized, the development regression suite was run. In addition to the development regression suite, the team relied on a customer regression suite, a manual smoke test, and additional exploratory testing. The developer regression suite safety net paid off well for the team and they had general confidence in their check-ins.

Despite the successful check-ins, the developer tests were not finding issues that were showing up in the more complicated customer models. To make matters worse, the big challenge with the customer regression suite was that it took almost a week of computation time on a high-end cluster to determine if the tests passed or failed.

In addition to the challenges of long computation times, reservoir simulation presented an additional challenge - the problems were being solved by approximation techniques. In other words, small perturbations in either data or algorithmic code, or even running on a slightly different processing environment, could create different output results. The development team built an intelligent differencing tool to help understand whether generated results were within engineering accuracy of the baselined results but the team still struggled with quality issues.

Developer tests were catching many regression issues, but the more complex customer regressions were still encountering many problems. Besides taking a long time to run, the problems discovered with the more complex customer data were also difficult to debug. As things were, both the developers and the testers on the Nexus team were barely keeping up with the defect backlog. And, when they did think they had things under control, customers would invariably find issues in beta testing or once deployed.

Typically, a given test scenario is run through the system and the results compared against a known baseline. For most software testing the difference is absolute. Landmark requires a smarter differencing engine that compares results and reports on whether the difference is within engineering accuracy. If they are, the new results then become the new baseline. If not, then there is an issue that needs to be addressed or understood.

The Solution

Landmark was drawn to LogiGear due to the availability of cost effective engineering talent and test automation expertise which included TestArchitect; LogiGear's keyword driven test automation platform designed for large and complex software.

While Landmark had been interested in performing more GUI test automation internally, their team simply did not have the bandwidth or expertise to do it well. This situation presented an opportunity to augment Halliburton's domain talent with LogiGear's proven test automation services and Agile project experience.

The first project kicked off with a small team of three testers in Vietnam and a part-time project manager based in California. The objective was to increase coverage through automation while, at the same time, freeing up Landmark's reservoir engineers so that they could perform more exploratory testing. The initial smoke test automation pilot project targeted the top six integrated workflows used for Nexus software training. Test leads for the pilot were established with workflows prioritized and accountability for initial automation split across assigned testing resources. . In addition to providing experienced test automation engineers, LogiGear also provided a maintainable test automation platform in TestArchitect. LogiGear worked with Landmark to customize the tool to fit their very specific needs. This customization was critical so that all of the test cases could be automated.

Using the Action Based Testing approach, LogiGear created test cases as a series of keywords (actions) with arguments. The automation focused not on automating test cases, but automating the actions. Since there are many fewer actions than test cases, and action implementations tend to be shorter than test case implementations, the automation effort is much more manageable. This manageability is especially evident when the application under test changes. Using TestArchitect, only a few of the actions had to be modified when the application changed. To ensure productivity through reusability and maintainability of tests, the test engineers were well trained in test case design by LogiGear.

The Results

The team effort to improve product quality demonstrated a significant improvement over the prior year. Landmark had a three month beta program with select key customers and improvements in quality proved to be substantial. The "Key Benefits" table on page two summarizes the results and compares them with the prior year. In the end, there was an 84% decrease in defects found in beta and a 97% reduction in the known issues found at product shipment.

Lessons Learned

Test automation is necessary to maintain velocity

Prior to this initiative the Landmark team was diligently working, but nonetheless struggling, to keep up with quality issues. Their existing automated testing was invaluable, but they still relied too much on manual testing.

Landmark also realized that additional automation suites could make a big improvement in their overall productivity. By augmenting test automation they were able to find issues faster and have domain experts spend more time on exploratory testing.

A testing strategy helps to maximize efficiency

The Landmark team had some good automation and exploratory testing but knew the testing effort could be better. Rather than adding more tests, they looked to see which types of tests would add the most value. For them, adding an additional set of functional tests and automating mundane testing paid off.

Outsourcing can work in an Agile environment

Landmark found that even test automation could be outsourced effectively with the right partner. The key was combining LogiGear's test automation expertise, Halliburton's domain expertise, and the US based project management that enabled the globally distributed team to work in an Agile development environment.

Treat your outsourcer as a partner

By aligning LogiGear's proficiencies and Landmark's strengths, the team was able to leverage their overall talent. Landmark found qualified petroleum engineers that were able to be part of the team and make significant contributions and combined them with talented testers that understood GUI test automation better than they did. LogiGear wanted Landmark to succeed and Landmark wanted LogiGear to succeed equally.

Cost effective global talent is available

By sourcing globally, Landmark was able to gain access to talent that had valuable skills to fill gaps at

a fraction of the cost. Landmark needed to make an investment to improve the quality of their product and current business conditions would not have enabled them to obtain the same effort had they sourced locally.

Distributed teams can be effective

The teams were globally distributed. Landmark and LogiGear aimed to minimize the overhead of the distribution by using a pattern common to software development – loose coupling and tight cohesion. Landmark and LogiGear aimed to have locally collated teams with tight cohesion, and recognized that there was coupling and dependencies across distributed teams. We first sought to understand those dependencies and then made sure to monitor and manage the dependencies.

The Future

A key strategy in order for Landmark to continue to provide leading edge software technology to the oil and gas industry is to maintain in-house domain experts and outsource the test automation expertise. Prior to the initiative to improve testing effectiveness, Landmark's team was diligently working but nonetheless struggled to keep up with quality issues. Since then, lasting productivity improvements have resulted from the tools and testing talent supplied by LogiGear. The collaborative approach that LogiGear provides creates a solid framework that makes it possible to scale testing to meet changing software development requirements.

The business relationship between LogiGear and Halliburton has come a long way since the initial pilot program with just three testers in the Landmark division. Today Halliburton utilizes LogiGear test automation experts throughout the company, TestArchitect has replaced many other test automation tools, and the company is using LogiGear's training division to train teams on best practices in test design and automation. The word has spread within Halliburton, and LogiGear is now working with over 20 divisions with 3-15 automation engineers per division.

Halliburton's partnership with LogiGear continues to grow incredibly fast as the company leverages the talent pool in Vietnam to fill skill gaps while the TestArchitect automation tool enables large-scale testing so that issues are identified faster.

LogiGear's products and services enable Halliburton's domain experts to dedicate more time to exploratory testing which is critical for complex software. With positive results through the combination of in-house management, outsourced testing, and TestArchitect test automation, Halliburton has increasing confidence in its ability to continue to deliver a high quality product to their clients.

About *Logi*Gear

LogiGear is a leading provider of software testing services, Test automation and application development and maintenance. We help organizations deliver better products while saving time and money. Since 1994, we have completed testing projects with hundreds of companies from early stage start-ups to Fortune 100, across a wide range of industries and technologies.

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