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Service Level Based Automated Software Quality Assurance Model

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Abstract. Software Quality Assurance Group has developed an innovative tool for service level based automated quality assurance model called "The PitStop". Pitstop provides the platform for software quality assurance Future of Work (FOW). This paper describes the key challenges of the conventional SQA mechanisms and provides insights on adopting a service based approach utilizing Pitstop tool. This is one of the earliest attempts for process industry to automate software quality assurance activities. This automation has resulted in bringing robustness to the function and thereby paving way for better operational models leading to better utilization and improved effectiveness.

Keywords: Software Quality Assurance, Service based approach, Cognizant, Automation, Pitstop

1. Introduction

Today's changing business environment saddled with challenges such as cyclical economic pressures, globalization, virtualization, emerging technology trends and the millennial behavior requires the software service organizations to focus on optimizing their operational processes to increase their efficiency and effectiveness. Typically software service organizations deploy Software Quality Assurance (SQA) group for maintaining a good process compliance culture benchmarking themselves with the requirements of various world class quality models. Process culture is sustained by performing activities such as trainings, facilitations, change management programs, audits, risk mitigation and management reporting [1]. Organizations typically invest ~ 3% of their budget in carrying out independent software quality assurance activities. This SQA is in addition to the verification and validation activities normally carried out in the form of Testing [1]. The objective of this paper is to primarily focus on the challenges faced by Software Quality Assurance's conventional model and share the experience of moving towards Service Level based Automated Quality Assurance Model. This has resulted in achieving cost optimization through enhanced mechanisms.

2. Conventional Software Quality Assurance Model

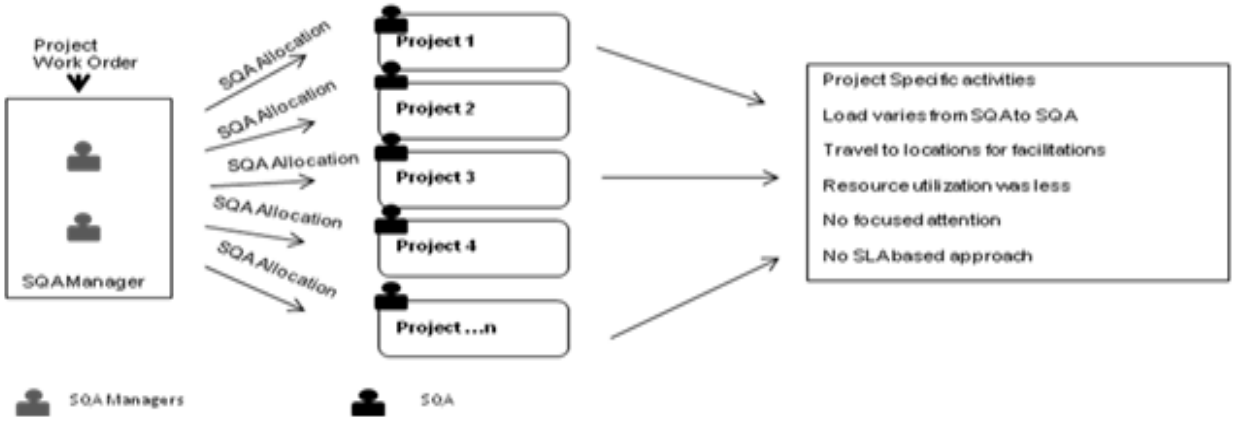

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Fig 1

A consultant from SQA Group is assigned every time a new project is initiated. SQA consultant will start discussions with the project manager and will be engaged in performing standard activities such as trainings, facilitation, reviews and process audits. As part of this operational model, each SQA consultant depending on overall business model and budget provisions, handles multiple projects, say ~ 20 projects, for adding process value. The allocation of SQA consultants to these individual projects is carried out by the SQA Manager for that respective portfolio / division. Most of the activities performed by the SQAs as part of this model require face to face interaction. In current scenario with distributed team being the norm for project execution, SQAs have to travel to these locations for supporting the projects.

3. Challenges in the conventional model

The conventional model creates more challenges and proves contradictory to the fast pace business growth model of the organization. With organization consistently demonstrating industry beating aggressive growth, conventional models were falling short in keeping pace to support the delivery team. Some of the key challenges faced by Software Quality Assurance Group during this high growth phase are narrated below.

3.1. Unbalanced work load

Phenomenal business growth led to creating distributed development centres across different locations such that local talent can be best utilized to provide value added services to clients. This warranted SQAG group to be spread its wings across locations to support the delivery teams. Since the projects were not distributed evenly across locations, this resulted in creating unbalanced work load within the team. By virtue of operating out of a specific location, SQA consultant would be either overloaded or underutilized depending on the distribution of projects in that location.

3.2. Repeated activities executed manually

Structured approach to collect data and analyze activities performed by the SQAs helped in identifying that at least 30% effort is spent on redundant and repeat activities which could be avoided with better system.

3.3. No service level based management

The conventional systems were lagging in terms of capturing the service levels for various activities performed by the SQA group. The users were unable to understand the status of the activities pending with their respective SQAs. Also there was no structured mechanism to evaluate the performance of the individual SQAs for the activities they are performing. There were no established benchmarks for each SQA activities to measure the performance on a sustained basis.

3.4. Frequent travel between locations

Lot of time was lost as non value added activities by travelling between locations to support projects for face to face interactions. This was one of the primary contributors to be addressed on priority for improving overall effectiveness.

Due to the above challenges the group faced lower utilization, lesser productivity and increased lead time of the activities. This in turn demanded a pressing need to create a new approach for performing software quality assurance activities more efficiently and effectively.

4. Service Level Based Automated Software Quality Assurance Model

Service level based Automated Software Quality Assurance follows a centralized integrated operational model compared to conventional process. As part of this integrated approach the activity request raised by projects (External) and SQAs (Internal) will be logged in to common system called “The PITSTOP”. The Pitstop was a tool developed for implementing the features of Service level based automated software quality assurance model. Pitstop is basically a web based tool which can be accessed by the Software Quality Assurance Group and Delivery Teams from any location.

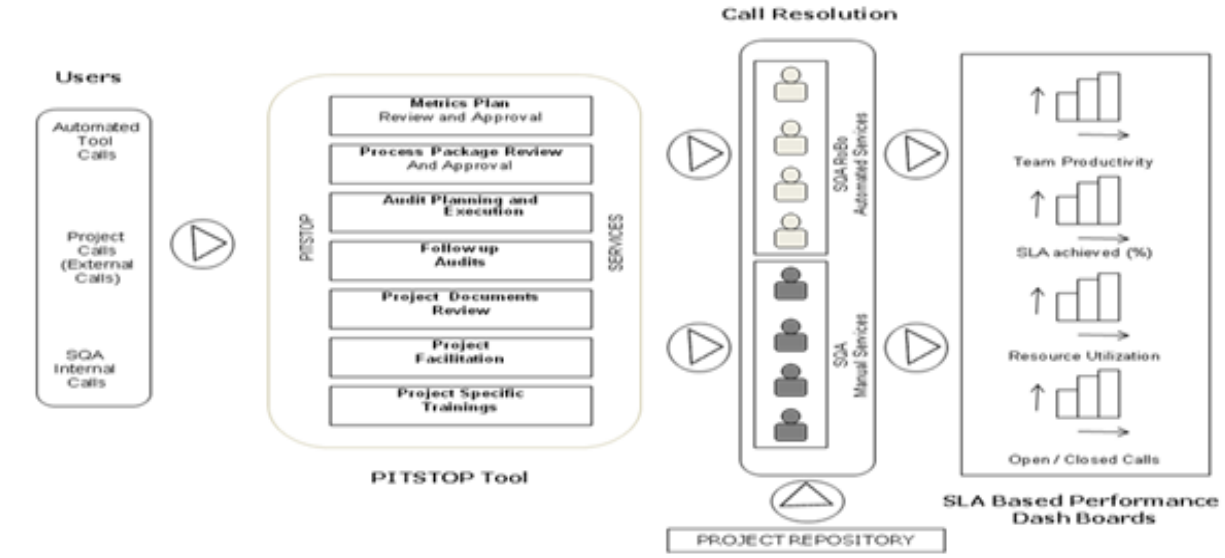

Fig 2

The above diagram showcases the Work Flow of the Pitstop tool developed based on Service Level based Automated Quality Assurance Model. The Pitstop has two major service lines, Manual and Automated Service line. Depending upon the service type the respective service lines will be triggered.

Manual Service Line: This typically consists of activities such as process facilitations, conducting audits and closure of audit finding. . The Project teams requiring SQA support will go through the service catalogue and raise the service request based on their need in the Pitstop system. The requests raised by project teams will be viewed by all the SQAs irrespective of their locations. Agnostic to project location from where the request has been raised based on the availability of SQA and priority of the calls, SQA consultants will be able to attend the calls. Once the call is complete SQA closes the activity in the PitStop and will start working on the next call. The Project team will review the closed call and will acknowledge the closure. In case if they are not satisfied they will be able to re-open the call for resolution.

Automated Service Line: Automation Testing is defined as developing and executing tests that can run unattended, comparing the actual to expected results and logging status [2]. Based on this concept, Automated Test Scripts for document review process were developed and integrated with the Pitstop work flow. Activities such as reviews of project artifacts like planning documents will be routed to the automated service line. The plans submitted for SQA review process will be reviewed by the “SQA Robo” Module in the system. The SQA Robo automatically reviews the plan by checking the relevant checkpoints and creates a review log for SQA’s approval. After creating the review log, SQA Robo automatically creates a review log call in the PitStop for SQA’s Manual review. SQA picks up the call and reviews the review log instead of reviewing the entire plan. Based on the review log, SQA rejects or approves the plan. The review log will contain the Pass / Fail scenarios for the check points applied during the review. This automation reduced close to 30% of the repeated activities performed by the SQAs on a monthly basis. Also it reduced the manual review effort for plans from 2 hours per plan to 8 minutes / plan. The effectiveness also increased several folds and this improvement was tested for statistical significance using Mann-Whitney test.

In Pitstop, each activity will have defined service levels thereby capturing the support performance for every call. The service level varies depending upon the activity type. The system captures the start and the end time of the activity and compares it with the defined service level. The SQA Manager can generate a report anytime to understand the performance at a group level, individual level and at an activity level. Based on analysis corrective and preventive actions will be triggered to increase the efficiency of the system.

Let us now see the key features and benefits of the Pitstop Tool:

4.1. Virtualization and Globalization

The PITSTOP system creates a virtualized and globalized platform by integrating all the locations. Since 80% of the activities performed can be managed through remote facilitation, it enables capturing all the activities in a central repository in an integrated manner and thereby lend itself for virtualization. This

enables the SQAs distributed across multiple locations to support projects irrespective of the base location from which they are executed. Additionally, features such as Project Repository and Project Call History makes virtualization much more effective. Currently this tool integrates seven geographically distributed locations and supports the SQA operations. This has helped to evenly balance the workload of SQAs, thereby facilitating effective demand – capacity management as well as help improve the work life balance of associates. This also increased the SQA productivity by delivering more with same capacity as it helped in increasing the number of calls being attended on a monthly basis.

4.2. Automation of SQA activities

The automated module in Pitstop has helped in reducing the manual SQA effort by 35%. This has helped the SQAs to handle more activities. Also the effectiveness of the SQA service had increased multiple folds because of automation. The SQA Robo plan review process checks for 270 checkpoints within an average time of 8 minutes per plan.

4.3. Cloud computing service using Pitstop

Cloud computing is a new and promising paradigm delivering IT services as computing utilities. As Clouds are designed to provide services to external users, providers need to be compensated for sharing their resources and capabilities [3]. The Pitstop tool was designed in such a way to support the concept of Cloud Computing. The tool helps the project teams to "Pull" the services required. If the projects need any service they will be pulling the required service from the team by placing a request in Pitstop. Each service type in Pitstop represents a cloud. Therefore the user can pull the required service based on their need. Similarly SQA will also be able to raise a call in PitStop for the activity planned for a project. This facilitates the "Push" Process. Currently, close to 70% of the activities are being pulled by the resources for action. Projects use Pitstop for "Pull" services like Delivery audits, Plan Reviews, Facilitations, and Clarifications etc. This way, Pitstop currently provides a cloud computing platform for SQA service model. Approximately 15000 employees utilize this system for Software quality assurance support and close to 95% of calls are getting closed on a monthly basis.

4.4. Performance based Model

By defining SLAs for activities, every SQA is facilitated to meet the SLAs defined in the system and thereby improve their performance. This also helps SQA to understand their individual productivity levels. SQA Managers are able to analyse the performance of SQA team at individual level and initiate appropriate actions. Additionally, SQA Manager performs the analysis at the group level and publishes the performance report on a periodic basis. By transforming to this model the productivity of the SQAs increased multiple folds compared to conventional model

5. Benefits Achieved

Conventional model had certain inherent limitations and constraints. By moving towards the Service Based Software Quality Assurance Model using PitStop, the team was able to increase the volume of work by 5.6 times for the same team size, Value added resource utilization increased by 120%, Productivity of the SQAs increased by 7 times and the lead time of Plan reviews got reduced by 60%. In addition to the above the cost per activity got reduced by 76%. Significance test using Manwhitney hypothesis test was performed to conclude the improvements achieved.

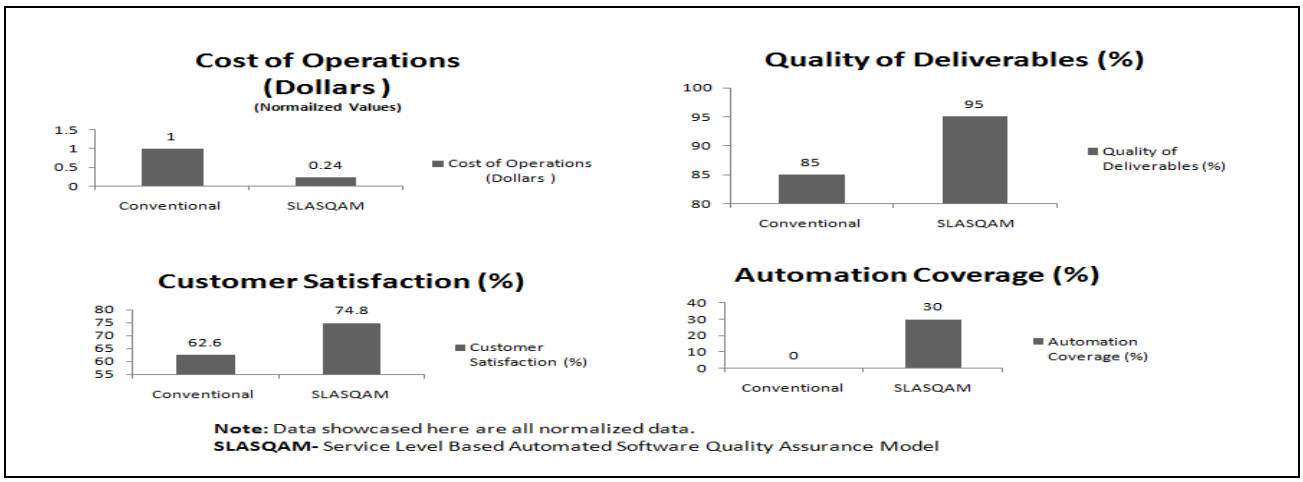

Fig 3

6. Change Management

A well structured change management approach was executed to bring this change. A workshop on PitStop model and tool was conducted across the user community. The Roll out was well planned and the proper governance model was executed to ensure smooth transition. It has been more than 2 years now after implementing this model.

7. Conclusion

The benefits realized through Service based approach demonstrate the robustness, efficiency and effectiveness built in the model compared to conventional mechanisms. The Pitstop System lays down the Future of Work (FOW) platform for software quality assurance group by considering the Virtualization, Globalization, Demand and Performance aspects. In addition, automation of software quality assurance activities has set a new trend in the industry. This has helped in building additional capacity for the existing team. The approach also extends its support for outsourcing the Software Quality Assurance activities from client organizations thereby creating a new business model within the process consulting industry. This approach would optimize the cost of the consulting organizations to a larger extend and provide direct cost benefits to the customers. Overall the approach would best suit the developed and developing software service organizations to effectively build software quality assurance group for their organizations. Service Level based Automated Software Quality Assurance model would be a trend setter in the industry and would continue to excel for years to come.

8. Acknowledgements

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