2008 NASCIO Nomination
IT Project and Portfolio Management

Software Quality Assurance (SQA) Services Offered in a Software-as-a-Service (SaaS) Delivery Model

State of North Carolina
Office of Information Technology Services (ITS)

B. Executive Summary

The concept of offering Software Quality Assurance (SQA) tools and services within a Software-as-a-Service (SaaS) delivery model began in 2004 at the State of North Carolina. The obvious benefit of a SQA service is to provide a more economical and efficient alternative to state agency-centric software testing tools, techniques, and platforms by eliminating the need for each agency to; 1) purchase or acquire their own test tools; 2) support and maintain individual testing platform infrastructures and; 3) acquire, train, retain, and effectively utilize costly SQA staff.

This approach generated a high level of interest from numerous state agencies that recognized the need to improve their SQA processes, methods, and tooling infrastructure in order to provide applications to their key stakeholders that meet or exceed expectations. A proof of concept (PoC) was performed in 1st Q 2006 that verified that state agency SQA testing staffs could effectively utilize and leverage an Internet accessible, centralized SQA testing platform infrastructure. The Office of Information Technology Services (ITS) was selected as the central location because this agency is normally responsible hosting of the majority of the infrastructure, networking and enterprise services/solutions for state agencies.

As a result of the PoC, an initiative was launched to develop the concept, architecture, budget, and cost recovery scheme for offering an SQA service within a SaaS delivery model that could offer a wide range of service level options aimed at meeting specific SQA testing needs of any state agency IT organization. The interested agencies agreed to contribute in shaping the framework for a cost recovery scheme and defining the following SQA Service offerings:

- Testability assessment services and other general Subject Matter Expert (SME)-based consulting
- Functional Testing Services
- Performance Testing Services
- Functional and Performance Testing Services (Bundled Offering).

In addition, the agencies decided on having the option of using their own testing staff or leveraging subject matter experts (SMEs) provided by the SQA Service to fulfill their testing requirements. ITS in turn agreed to host and maintain the service including software, hardware, and testing platform infrastructure.

The final proposal and recommendations for deploying the service was presented to, and endorsed by, executive management in June 2006. Over the next 14 months, staffing, software acquisition, and platform infrastructure provisioning was performed in preparation for the service launch which officially occurred in August 2007 with eight state agency IT organizations initially participating.

The enterprise-based SQA Service as it stands today offers a highly reliable, scalable, secure, and economical “utility” type service that can be leveraged by agency IT organizations on-demand. The SQA service supports and maintains a full range of software testing tools in order to meet the testing demands for many of today’s highly complex IT business applications as well

as a range of service levels that state agencies can choose from to meet their specific needs and budget.

C. Description of Business Problem

C1. Business Problem

Under the prevailing governance model for technology in State of North Carolina, agencies are responsible for development, testing, support, and maintenance of their software applications. ITS is responsible for the infrastructure, networking and enterprise services and solutions for the majority of the state agencies. Due mostly to budget constraints and lack of experienced SQA software-testing staffs, agencies were consistently failing to test their IT applications. This lack of testing not only affected new software applications prior to full production and implementation, but also existing applications that required maintenance/patch updates or enhancement releases applied to them. As a result of this inherent problem, the rationale for implementing SQA testing capabilities within a SaaS delivery model became apparent. Other reasons state agencies did not adequately test their software applications include but are not limited to the following:

- The time, effort, and lack of knowledge or expertise associated with researching and acquiring SQA tools, testing platform infrastructure, and exposure with these tools was cost prohibitive
- Little or no institutional commitment to an Software Development Life Cycle (SDLC) process that focused on SQA as a key component or a software release mechanism for testing and delivering quality applications on time
- Regression testing is too costly and time consuming to implement without the use of automated testing
- Hardware and software infrastructure required to execute testing functions is costly and static while demand is dynamic and unaffordable for most state agency IT shops to "do it right…"
- No statewide enterprise SQA Service for state agencies to leverage and utilize for testing their software applications.

C2. Business Solution

The SaaS model was selected as the preferred delivery scheme for an enterprise "SQA-as-a-Service" because it represented the most economical and efficient method for implementing a best in class, highly leveraged, on-demand alternative to state agency specific approaches to SQA. This approach was a natural fit because the SaaS model allows for accelerated deployment of a business capability while shortening the time to value realization and mitigating risk.

Another advantage for proceeding with this model is that it afforded the state to: 1) consolidate over $500K+ pre-existing software-testing tool licenses into a SQA Services license "pool"; 2) purchase additional licenses to complete the portfolio of software testing licenses required to meet all of the agency's on-demand testing needs; and 3) better leverage vendor pricing for future software licenses. Other equally important benefits to using the SaaS model include:

- No time consuming or costly RFP process required for state agency customers

- No upfront capital expenditure or appropriation required for software and hardware infrastructure
- No long-term costs for maintenance and support of the testing platform infrastructure
- Ability to leverage a monthly subscription fee or utilization based cost recovery scheme for the services provided
- Cost differentiation is based upon the desired service level tier needed by the state agency customer
- Economies of scale resulting from many customers – the more agencies that join the service the lower the cost for everyone that uses it
- A single instance platform with multi-tenancy support

In its present configuration, an SQA Services Product Manager oversees the operation of the service while managing three staff specialists that perform production support for the SQA service platform, respond to service incidents, and provide testing services to state agency clients when needed.

A website was also developed for potential client agencies to learn more about the service and for existing users to login to the tools, keep informed about upcoming maintenance, and access available testing resource documentation.

Since the launch of the service in August 2007 with eight participating agencies, one has been added so there are presently nine state agencies realizing the value and benefits associated with this SaaS offering. The on-boarding forecast for the coming fiscal year includes three additional state agency prospects that are considering joining the service.

The following represents an inventory of the objectives, oversight, and outcomes that were met as a result of this project:

Objectives

- Get state agency buy-in and validation of the SaaS delivery model and approval of the service level options offered
- Provide a low cost alternative to state agencies for performing SQA testing by utilizing an on-demand SaaS delivery model that requires no upfront investment
- Maximum utilization and investment leverage resulting from the consolidation of pre-existing QA software licenses into a shared license pool owned and maintained by the SQA Service
- Provide the ability to access testing tools 24 x 7 or leverage Subject Matter Experts (SME's) on a Time and Material (T&M) basis in a managed, supported, and secured environment
- Reduce or eliminate the need for each agency to maintain hardware and software infrastructure supporting SQA activities
- Provide a service that allows state agencies to release higher quality applications that perform within expectations, improve customer satisfaction, and lower the Total Cost of Ownership (TCO).

Oversight

- Hosting, maintenance, and support of SQA Service is managed by a centralized IT service organization (ITS)
- Offer a wide range of SQA service offerings including SME's that can be utilized on a T&M basis
- Provide differentiated pricing to state agencies by offering high, medium, and low service level subscription tiers and associated costs for each.

Outcomes

- 24 x 7 availability of SQA Service
- Ensure Service Level Agreements (SLA's), and Operating Level Agreements (OLA's) are met on a consistent basis.

D. Significance of the Project

The overall significance of this project for North Carolina State Government includes the following:

- Developed an SQA service offering that encompasses the previously described key features while leveraging economies of scale resulting from multi-agency use of the service
- Consolidated all pre-existing software-testing tool licenses which resulted in aggregating $500K+ of software assets already licensed by four state agencies into a SQA Services license "pool"
- Allowed State agencies the ability to meet their testing needs on a more timely and efficient basis via the Internet
- Allowed State agencies to utilize their limited testing resources more efficiently and effectively by focusing on SQA tasks for any given application and not the day-to-day maintenance and support required for the testing platform infrastructure.
- Public-facing IT applications are tested more thoroughly due to the availability and use of the SQA Service thereby reducing the risk of potential failure of applications, downtime, and the high cost associated with defect repair after production implementation.
- Cost to acquire and maintain best-in-class SQA testing tools and testing platform infrastructure independently between the agencies is cost prohibitive.

E. Benefits of the Project

The greatest benefits realized by the public or other stakeholders are: 1) deployment of tested, quality driven software applications: 2) the state agencies' reduced operating costs as a result of consolidating hardware, software, and human resources; 3) improved time-to-launch for introducing new applications that perform and behave as expected and; 4) increased stability and uptime of service applications for both state and public users.

Other qualitative and quantitative benefits include:

- Higher quality applications that perform within expectations results in improved customer satisfaction and a lower total cost of ownership TCO
- Economies of scale from a shared service offering allows lower entry costs for using the SQA technology that would normally be out of reach or unaffordable for most state agency IT organizations
- Increase opportunities to QA more applications with the same or less resources at lower cost points to complete these tasks
- Early stage SQA investments within the context of an application's SDLC will yield better quality software, more efficient use of resources, and faster time to value for new application deployments
- Cost to fix post production defects can be as much as 10 times the cost to fix the same defect in pre-production and this effects the TCO profile for any given application
- Eliminate potential risk of deploying applications that do not meet functional or performance requirements
- Prevent erosion of end-user confidence due to unstable applications

Financial Return on Investment

Software Quality Assurance Service – Cost Avoidance

The functionality and capabilities provided by the SQA Service – if implemented independently by each state agency IT organization – is costly, complex, risky, and time consuming. Without the launch of this service, agencies would be left to research and implement their own solutions independently, as well as bear the direct costs that would far exceed the cost associated with an enterprise service approach. An order of magnitude analysis to illustrate this point is as follows:

Enterprise Costs: **$ 4,550,617** (borne by ITS)
Agency Independent Implementation Costs: **$ 35,155,428** (covers 8 agencies)
Estimated Net Savings: **$ 30,604,811**

These figures were derived from vendor price lists and are based on estimated five-year life cycle costs. Not all figures used to derive the Estimated Net Savings are shown in detail.