SQA CONSULTANT

Inventing the future....

Offshore Quality Assurance

White paper - August 2014

User Acceptance Tests

Test Case Execution

Quality
Definition

Test Plan

Test Design

Test Case
Development

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Introduction

Over the years, there have been a number of failures caused by software bugs in high level Aerospace applications and Military grade equipment such as the famous Soviet early-warning monitoring system bug in 1983. These failures have been caused due to a number of reasons including the lack of a proper Software Quality Assurance system, the inability to identify causes of failures early in the development phase of software and to validate the software successfully.

In retrospect, we have the pressing issue of efficiently checking, monitoring and evaluating the System of Software Quality Assurance.
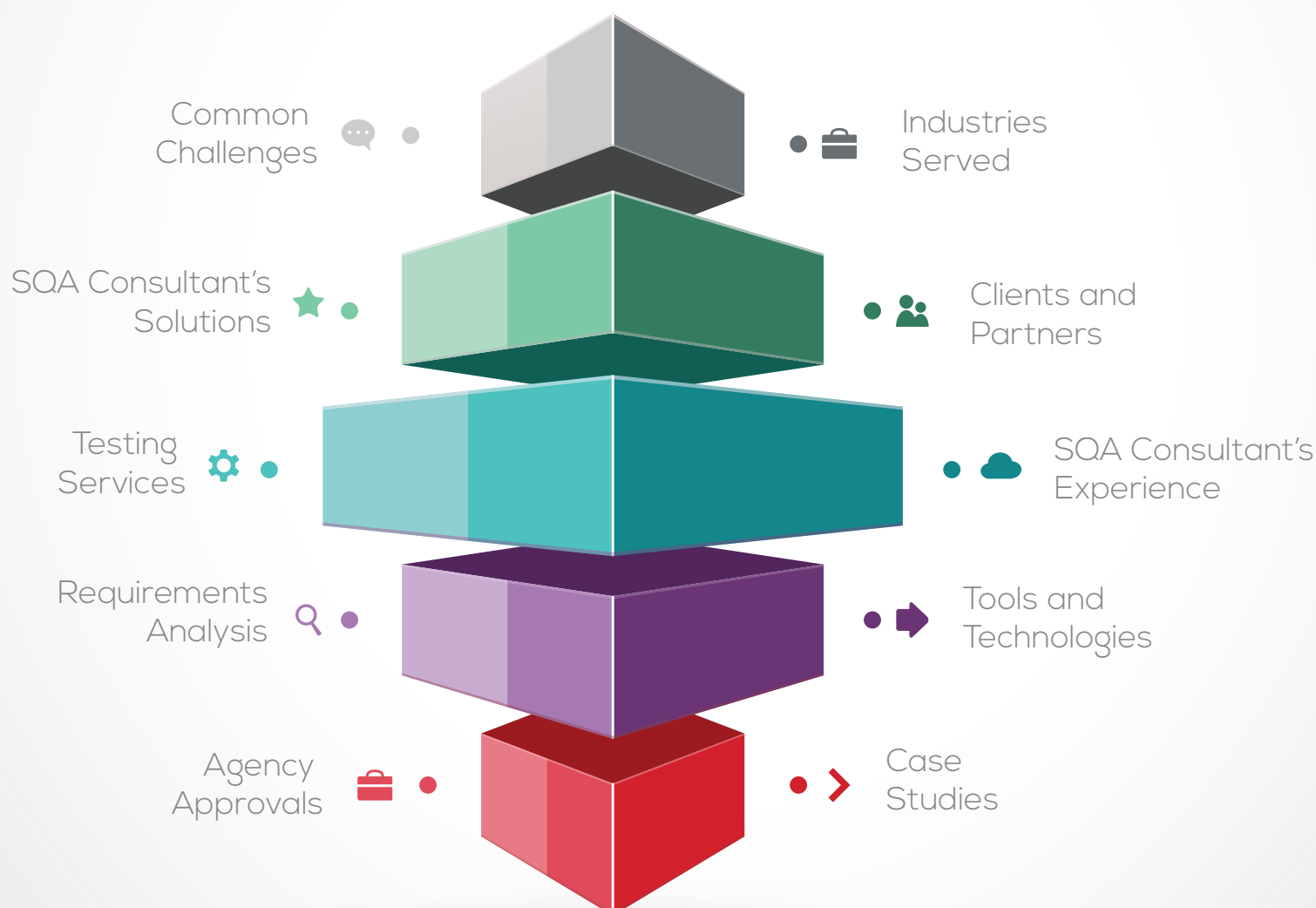
Once the system is streamlined, the Quality of the Software being constructed and maintained can also be scrutinized.

Highlights

This paper details the challenges, solutions, and SQA Consultant's expertise available for organizations wishing to improve their software development process, reduce costs, improve quality, and increase reliability of products. It also presents examples of some of our clients that have successfully implemented our strategic SQA and, as a result, have become more competitive.

Highlighted areas:

Common Challenges

Industries Served

SQA Consultant's Solutions

Clients and Partners

Testing Services

SQA Consultant's Experience

Requirements Analysis

Tools and Technologies

Agency Approvals

Case Studies

Common Challenges

The results of software development projects are notoriously poor, with 68% not delivering as intended and an estimated 40% of every development dollar wasted on correcting defects and completing unnecessary rework. Software quality testing is often left to the end of the development lifecycle, making software defects difficult to detect and fix. As the time runs out, vital tests may be skipped in the rush to complete the project on-time. Enterprises then face the risk of releasing error prone software which, if it fails, will result in massive costs of downtime.

Often systems are so infested with defects that they have to be abandoned altogether. This means millions of dollars, in terms of man-hours and investment, are wasted on developing software that's not fit for purpose. But software development doesn't have to be this way. With continuous Quality Assurance, SQA Consultant team ensures that software projects are delivered on time, in budget, and fulfill desired goals.

A core reason of slow and wasteful projects is poor requirements definition, which can cripple projects before they've even left the design stage. In fact, over 70% of projects are estimated to fail due to poorly

>> Clear, precise definition of requirements is fundamental to a project's success.
>> Testing quality at the end of the development lifecycle is another key reason/challenge why software delivery can be such a slow and wasteful process.
>> Testing software for performance and scalability late in delivery cycles poses significant risk to a project's chances of success.
>> Without central management of test cycles and assets, QA teams are often unaware of: what has already been tested, what the test results were, and what still needs to be done.

Millions of dollars, in terms of man-hours and investment, are wasted due to no or poor quality assurance system

Every day, thousands of enterprises rely on several applications and software to drive critical business processes and keep vital services running.

Their success depends on software performing effectively and fulfilling the tasks for which it was designed.

Testing Market Analysis

The need to prepare quality products, coupled with fast changing technological environment and pressure to reduce cost, has contributed to the growth of software testing outsourcing market at a phenomenal rate.
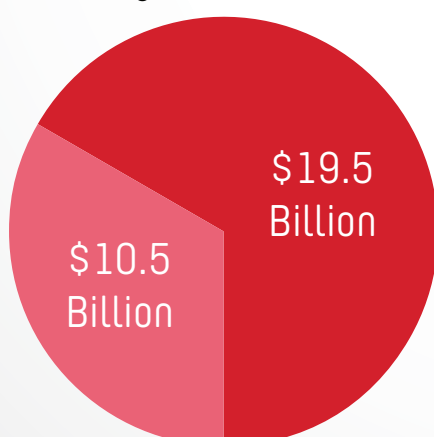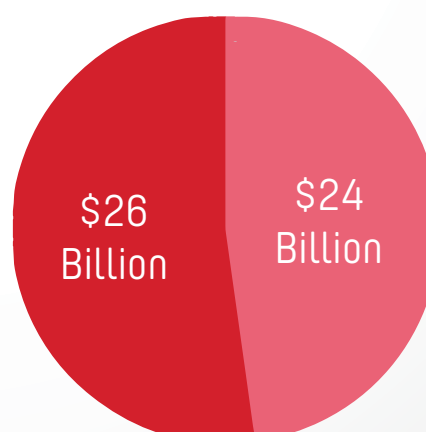
Software Testing Market Growth

In House
$20 billion

Outsourced
$10 billion
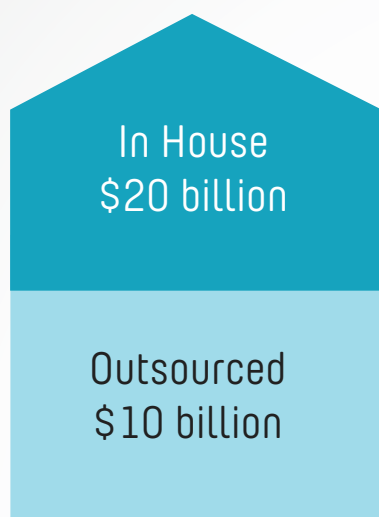
Global Testing Revenue
$30 billion

Year 2010
Market
$30 billion

CAGR20%
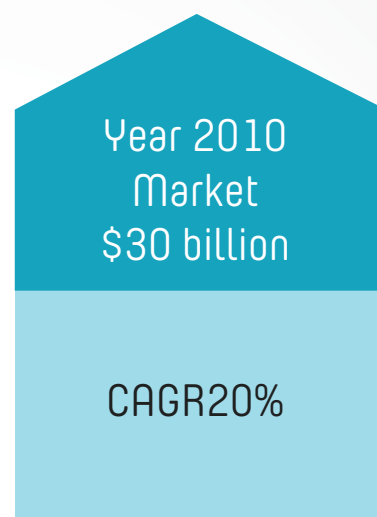
Year 2014 Market
$38 billion

Testing Market 2010

$19.5
Billion

$10.5
Billion

Testing Market 2020

$26
Billion

$24
Billion

- Outsourced
- In-House

- Absolute growth: 148%
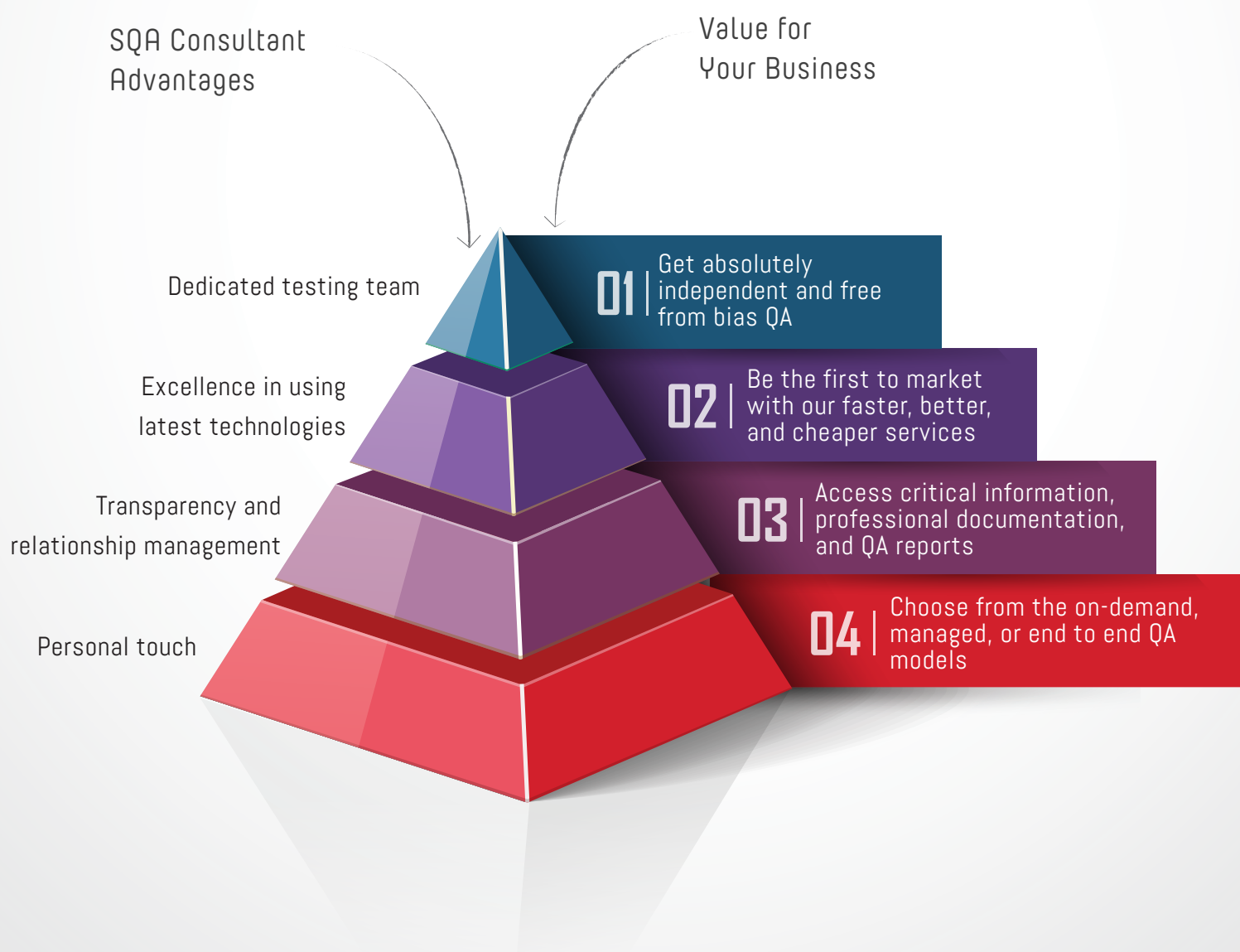- Compound Annual Growth Rate (CAGR)
  of outsourced testing: 9.49%

About SQA Consultant

SQA Consultant offers end-to-end quality assurance services focusing on delivering value at each step of the software development process. By introducing quality assurance early on in the development process, we help organizations meet time-to-market deadlines and mitigate risks early in the process.

SQA Consultant acts as a Testing Center of Excellence where knowledge, skills, tools, and processes are shared among projects. With this integrated approach towards quality testing, we have devised processes to get a product's quality right the first time. Our clients in the rail, gas detection, mining, health care, material handling, and power industries leverage our expertise and experience to achieve higher efficiency and better quality with reduced cost.

SQA Consultant team lives and breathes quality. We believe that improving the quality of operations and projects turns around a business. We have transformed the concept of quality from 'a bottleneck' to 'the bottom line' for many companies. Unlike many outsourcing companies that use QA as a stepping stone to win other projects, QA is SQA Consultant team's sole mission of existence.

SQA Consultant Advantages

Value for Your Business

Dedicated testing team

Excellence in using latest technologies

Transparency and relationship management

Personal touch

01 | Get absolutely independent and free from bias QA

02 | Be the first to market with our faster, better, and cheaper services

03 | Access critical information, professional documentation, and QA reports

04 | Choose from the on-demand, managed, or end to end QA models

What sets us Apart?

Excellence

SQA Consultant comprises of certified resources with expertise in cutting edge technologies, working as an absolutely independent body. The team experience guides the passion of using latest technologies in innovative ways for the optimum output. With exposure to diverse industry environments and technologies, we add a personal touch in each project that is beyond the academic approach of quality assurance.

Transparency

One of the inherent challenges of QA is to communicate the observed issues to the development team in the right spirit. The communication becomes even more critical when offshore outsourcing is involved. We believe that when clients outsource their projects to us, they deserve to know the honest opinion of QA experts. Our communication protocol enables our clients to see the progress, provide their input, request changes, and receive our consultancy on issues in real time.

Trust

With unfailing commitment to excellence and transparency in our work, we have built a strong reputation of trustworthy quality assurance partners for end to end projects as well as on demand QA services. The high level of trust is depicted from a large number of our returning clients who consider us an integral part of their own teams. We provide our clients with the comfort of working with the same team over the years unlike most outsourcing companies who struggle to retain their teams. Our team retention capabilities save our clients' time and effort in sharing the required knowledge base about a project.

Flexible Business Model

We believe that the customer satisfaction and ease of doing business with us is the foremost for our corporate mission. Therefore, we offer flexibility in our business model to accommodate clients' unique QA needs. Although the team structure and processes are tailored specifically according to each project's needs, following are the categories that represent two of our major business models:

» End to End Consultancy

For clients who want to outsource an entire testing project, the most suitable model is end to end consultancy. The clients' major contribution in this model is to describe their requirements and then we take the complete responsibility to deliver a successful project.

» On Demand Consultancy

Outsourcing a portion of a project that falls out of areas of expertise or time limits is also a common practice. SQA Consultant team offers a number of viable options for clients who want to engage expert QA consultants for specific projects or parts of a project only.

Key Benefits:
> Minimize business risks while enjoying the quality of in-house teams
> Access the extensive collection of automated scripts, testing best practices and proprietary techniques

Our Solutions

Systematic Approach to Save Time, Effort and Cost

With SQA Consultant Solutions:

» Requirements are clearly and accurately defined

» High quality automated testing checks software quality at every stage

» Projects are accelerated and software is delivered on time, in budget, and with all the required function-alities

» Market leading requirements management and automated test tools are used to build quality into soft-ware throughout the development life cycle

Testing Services

SQA Consultant works as an independent company, operating as a Center of Excellence (C.o.E.) providing services to different clients. This gives us freedom to continuously improve processes, hone our skills, and accumulate extensive knowledge base. Experience of providing different testing services on multiple projects helps us in developing these skills over the years. Supported by such experiences, we proactively manage the quality assurance needs of our clients.

Big Data Testing
- ETL Testing
- Transforming Data
- Data Upgrades
- Data Visibility/Value Extraction

Compatibility Testing
- Browser Compatibility Testing
- Operating System Compatibility Testing

Functional Testing
- Embedded Applications Testing
- Web Applications Testing
- Mobile Applications Testing

Mobile Testing
- Compatibility Testing
- Functional Testing
- Usability Testing
- Performance Testing
- Security Testing

Performance Testing
- Performance Testing for Web Applications
- Performance Testing for Embedded Applications

Security Testing
- Transparent Layer Protection
- URL Access Restrictions
- Session Management
- Direct Object Reference

Static & Dynamic Analysis
- SQMLint & PCLint
- LDRA & McCabe
- Doxygen & Tessy®
- Programmers Heaven

Test Automation
- Req. & Application review
- Test Case Preparation
- Test Script Development
- Script Execution & Result Analysis

Test Management
- QA Project Plans & Test Plans
- Bug Modeling
- Project Matrix
- Quality Reports
- Risk Assessment

Requirements Analysis

Identifying the requirements for a project is like laying the base for the architecture; the entire project's success or failure depends upon the quality of requirements. The role of requirements in a project begins with requirements identification and goes on during the entire project taking on various shapes and forms. That's why SQA Consultant has devoted a key role to requirements analysis in its mature quality assurance methodology. Following are the major success factors in our requirements analysis process.

» Requirements Identification and Validation
» Requirements Documentation
» Requirements Change Management

Agency Approval

SQA Consultant provides you expert consultancy about the best suitable agency standard(s) for your products. We help you produce the relevant data, audit reports, product documentation, and other artifacts required for these standards.

Having experience of working as an 'independent verifier and validator ', we can take care of all the communication, and respond to the objections raised by the concerned agency during the process. After the product certification, we offer complete support and consultancy in case of any modification in product design or a change in the standard requirements.

We have an excellent track record in achieving agency approvals for industrial products from European and American safety agencies ranging from safety integrity level SIL 1 to SIL 3. We have been working with the world's top 3 safety agencies. Some notable standards that we worked on include EN 50128, IEC 61508, EN 50126, EN 50402, EN 13849, and EN 50271.

Industries Served

|	
Rail	Healthcare
Energy	Education
Airline	Mining
Gas	E-commerce
Telecom	Material Handling

Served Clients

Our business is focused on making every client interaction a positive experience to ensure that we are on the road to success. We believe that consistently delivering high quality results is the way to achieve this. Our relationship with clients begins with understanding their requirements and results in client satisfaction, guaranteeing a long term relationship ahead.

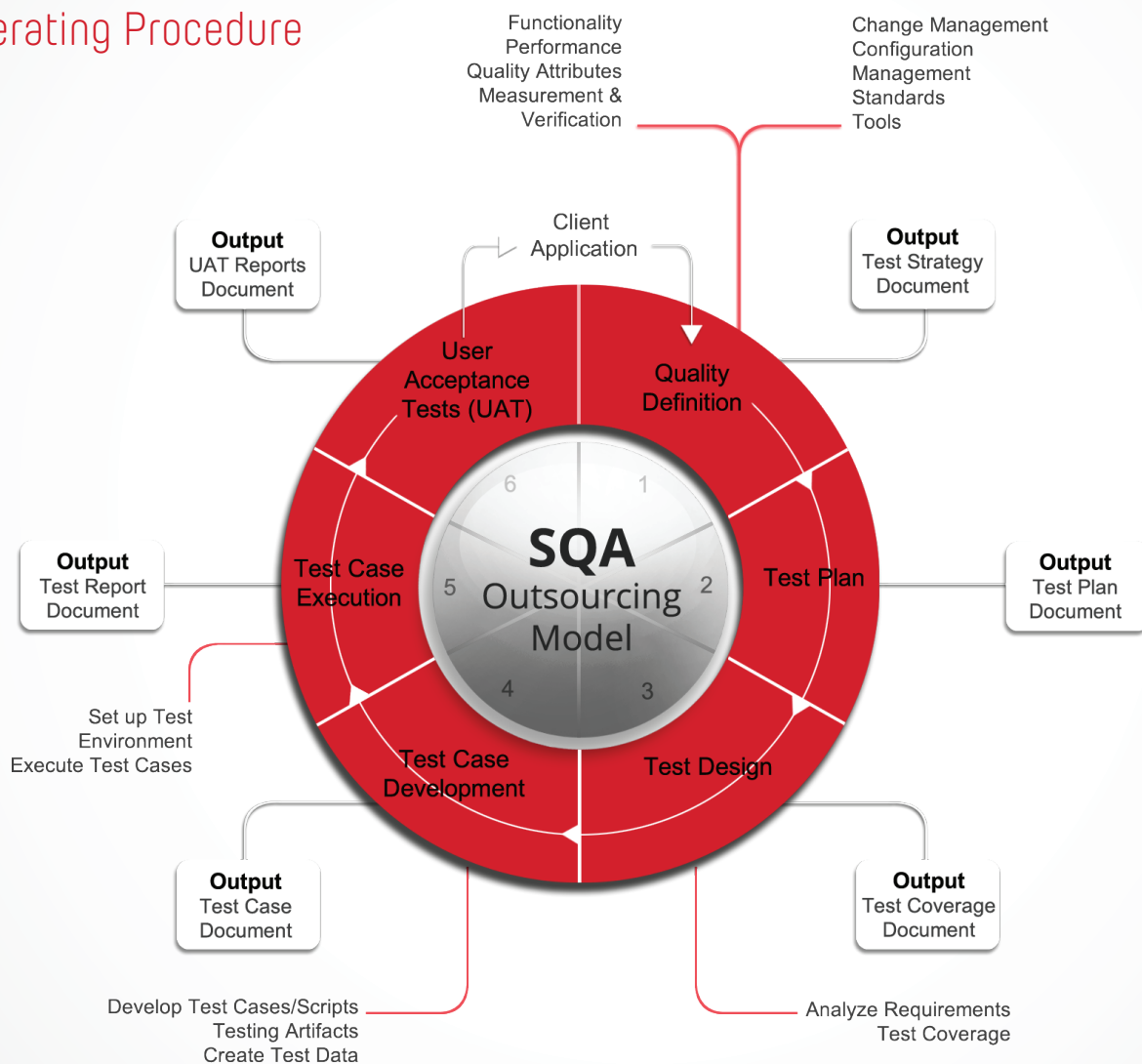Systematic Approach to Save Time, Effort and Cost

Our Partners
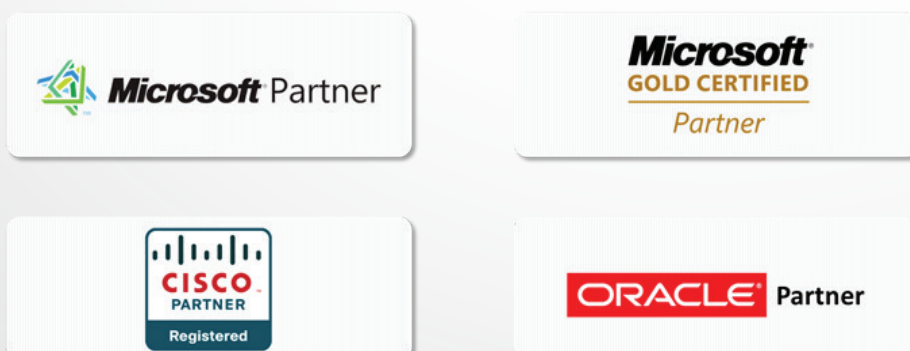
Why SQA Consultant?

Our Experience

Our experience reflects our diverse background; this is something that makes us unique!

Operating Procedure

Functionality
Performance
Quality Attributes
Measurement &
Verification

Change Management
Configuration
Management
Standards
Tools

Output
UAT Reports
Document

Client
Application

Output
Test Strategy
Document

User
Acceptance
Tests (UAT)

Quality
Definition

SQA
Outsourcing
Model

6   1

5   2

4   3

Test Case
Execution

Test Plan

Output
Test Report
Document

Output
Test Plan
Document

Set up Test
Environment
Execute Test Cases

Test Case
Development

Test Design

Output
Test Case
Document

Output
Test Coverage
Document

Develop Test Cases/Scripts
Testing Artifacts
Create Test Data

Analyze Requirements
Test Coverage

From the philosophical definitions to the flimsy concept of equating quality with high price, the word 'quality' takes many shapes and forms. For us, at SQA Consultant, a quality product is one that pleases its users in unexpected ways. To achieve this, we meticulously pay attention to every pixel so that quality is improved incrementally in every possible way. We assure that each product, that we help build, is rated as the best in terms of functionality, reliability, productivity, and scalability.

Our approach is to introduce testing early into projects and then keep it going throughout the project life cycle. Our offshore model illustrates the quality assurance activities that we carry out at each step of a project.

Tools and Technologies

Testing Tools for Web/Desktop Applications

Tools	Description
Advanced Data Generator	Comprehensive test data generator tool that can generate data for your database, CSV files, SQL scripts and more.
Link Checker Pro	Used for website analysis and the detection of broken links. Ability to create a graphical representation of the website.
Quick Test Professional	Used for functional, regression test automation of Web-based and window-based applications.
Red Gate	A Tool Suite used for comparing and synchronizing SQL database content, data generating, SQL scripting, and database documentation.
Load Runner	Tool used for Web-based and Desktop-based applications load testing and performance measuring using virtual users.

Testing Tools for Security Testing

Tools	Description
Acunetix Web Vulnerability Scanner	An automated web application security testing tool that audits web applications by checking for exploitable hacking vulnerabilities.
AppScan	A vulnerability scanner which can detect common server misconfigurations as well as vulnerabilities.
Wireshark	A network protocol analyzer.
Ratproxy	A semi-automated, web application security audit tool for detecting security-relevant design patterns.
Webscarab	A framework for analyzing applications that communicate using the HTTP and HTTPS protocols.
WebGoat	An interactive teaching environment for web application security.
Brutus	A remote password cracker software.
JHijack	A Java fuzzing application used for numeric session hijacking and parameter enumeration.
HackerFox	A collection of Firefox add-ons which are used in web application security testing.

Test Automation Tools

Tools	Description
Quick Test Professional	Used for functional, regression test automation of Web-based and window-based applications.
Load Runner	Tool used for Web-based and Desktop-based applications load testing and performance measuring using virtual users.
AutoIT	Used for the automation of desktop applications.
NI Test Stand	Used for automation of test cases for regression testing for hardware
LabVIEW	For real time implementation and I/O interfacing.

Static Code Analysis Tools

Tools	Description
Source Monitor	Used for checking code complexity.
Doxygen	Used for creating documentation for the code.
ReSharper	Used for static code analysis of MS Visual Studio .NET.
Source Insight	For white box Testing.
PC Lint	Used for verifying MISRA-C compliance.
SQM Lint	Used for MISRA-C compliance.
CCCC	Used for checking code complexity level.
FXCop	Used for static code analysis.
AStyle	For C code Alignment.
LDRA	Programming Standards Verification Structured Programming Verification Complexity Analysis Full Variable Cross Reference Analysis Unreachable Code Reporting Static Data Flow Analysis Information Flow Analysis Loop Analysis Analysis of Recursive Procedures Procedure Interface Analysis Statement Coverage Branch/Decision Coverage LCSAJ Coverage MC/DC Coverage Dynamic Data Flow Coverage

Testing Tools for Code Simulation

Tools	Description
Advanced Data Generator	Tool is used for the databases or databases applications.
Matlab	For PI & FUZZY controller design.
Modelsim	For VHDL/Verilog code simulation.
Simulink, PSPICE, MULTISIM	For controller, power electronics and wind turbine system design.
AVR Studio	For simulation of firmware of AVR series microcontrollers.

Configuration & Bug Tracking Tools

Tools	Description
Team Foundation Server	Used for code & documentation version and tasks management.
PVCS	Used for documentation version management, change management and bug tracking.
Quality Center	Used for Test Management.
JIRA	For Issues repository.
Testlog	Test case repository application.

Case Studies
Web Based Projects
Gas Monitor Management Web Application

Description

A comprehensive gas monitor management web application solution. The application is responsible for performing scheduled tasks such as calibration, bump, diagnostics, and record-keeping. In addition it remotely monitors the condition of the equipment fleet and provides reliable reports to the customers about their fleet.

Activities Performed

Security testing has been performed to make sure that the application is reasonably secure for the top 10 security vulnerabilities identified by OWASP (Open Web Application Security Project) Standard. Functional, regression and usability testing has been performed throughout the project iterations to raise the quality of the application to a certain level.

Telemedicine & e-Consultation

Description

CureTel is a web based telemedicine and e-consultation application which facilitates fast and efficient communication between patient and consultant. The patient just needs to go to the nearest CureTel Center to confer with leading consultants worldwide for consultation and second opinions.

Activities Performed

Performed Functional, Integration, GUI, Performance, and Regression testing of the application.

Real Time Data Acquisition and Reporting

Description

This project is about a secure web-based platform for dynamic monitoring & diagnostics of remote locomotives. It provides automated remote monitoring, system-health status, website reports customized for user, remote data-logger access, remote firmware updates, predictive maintenance and automatic request for service. The application is also capable of generating customized reports like:

» Local supervisor (Productivity, speed violations)
» Maintenance supervisor (wheel slip, selected faults)
» Communications department forms (RF Comm. loss)
» E-mail alerts for defined faults, failures, and/or warnings

Activities Performed

Performed System Testing, Functional Testing, Integration Testing, and GUI Testing.

Requirements Management Application

Description

This application provides a comprehensive requirements management environment that helps the development of requirements through efficient communication and collaboration across the enterprise. It actively engages all stakeholders in a collaborative process by providing a web interface to access the requirements database from anywhere, anytime.

Activities Performed

Performed Functional, Integration, GUI, Performance and regression testing of the application.

Embedded Projects

Radio/Remote Operated Locomotives

Description

This project is about radio remote control firmware with dual CPU architecture. This is a highly safety-critical embedded application used in the rail transportation industry and complies to EN-50128, which is a well-known safety standard for the rail industry.

Activities Performed

Along with functional and dynamic testing of these control systems, detailed white box testing is performed to make the systems compliant to EN-50128 safety standard. For static analysis, automated testing is also performed during code walk-through and code inspection phases.

Advanced Radio/Remote Operated Locomotives

Description

The project is concerned with the Locomotive Control Unit decoder as the central brain of Locomotives. This embedded application is a highly safety-critical application used in rail transportation industry. The advanced features of this product are self-decision making on the speed control system and braking system.

Activities Performed

Along with functional testing on real time environment this firmware is also tested on Locomotive simulators, Transponder & GPS simulators, Map/Track simulators.

Embedded Control Systems for Material Handling

Description

This project is about radio remote control firmware for safety level systems with dual CPU architecture. These systems are used in material handling industry applications like Cranes, Truck Equipment Control, Petroleum Production, Construction, Power, Gas Utilities, etc.

Activities Performed

Along with functional and dynamic testing of these control systems, detailed white box testing is performed to make the system compliant to EN-13849 safety standard. For static analysis, automated testing is also performed during code walk-through and code inspection phases.

Embedded Control Systems for Mining

Description

This project included Data Acquisition and Monitoring for Mining Equipment. The system includes Remote Configuration, Alarm Notification and Management, Remote Diagnostic Reports and Remote Health Monitoring.

Activities Performed

Functional, integration and performance testing are performed to ensure a consistent behavior in unexpected and unnatural scenarios. Detailed white box testing is also performed to make sure that the firmware is compliant to EN-13849 standard.

Gas Monitoring Devices

Description

The scope of the project is to develop firmware for gas monitoring devices that contains different types of sensors responding to different levels of gas concentration.

Activities Performed

QA activities include firmware requirements and design reviews, preparing testing documents which include Test plan, Traceability matrix and Test reports. Testing activities include black box testing and white box testing, consisting of MISRA-C compliance, code complexity, commenting and naming convention standards verification using SQM-Lint, CCCC & Doxygen respectively.

Docking Station for Gas Monitoring Devices

Description

This is an advanced Docking Station with the capability to directly upload the instrument data to the web server. A Docking Station is connected to the internet via wired/wireless medium. It is capable of calibrations, bump tests, diagnostic tests, and data log data downloads. All of these are also controlled by the central web server. The docking station also serves as a battery charger for instruments with rechargeable batteries.

Activities Performed

Functional testing is performed for all system functionality, audit of test scripts and other related artifacts is also performed, and security testing of the configuration application hosted on the VDS is also part of the testing scope.

SQA CONSULTANT
Inventing the future....

Contact Us

Explore ways to use our expertise in growing your business while establishing a valuable partnership with us.

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