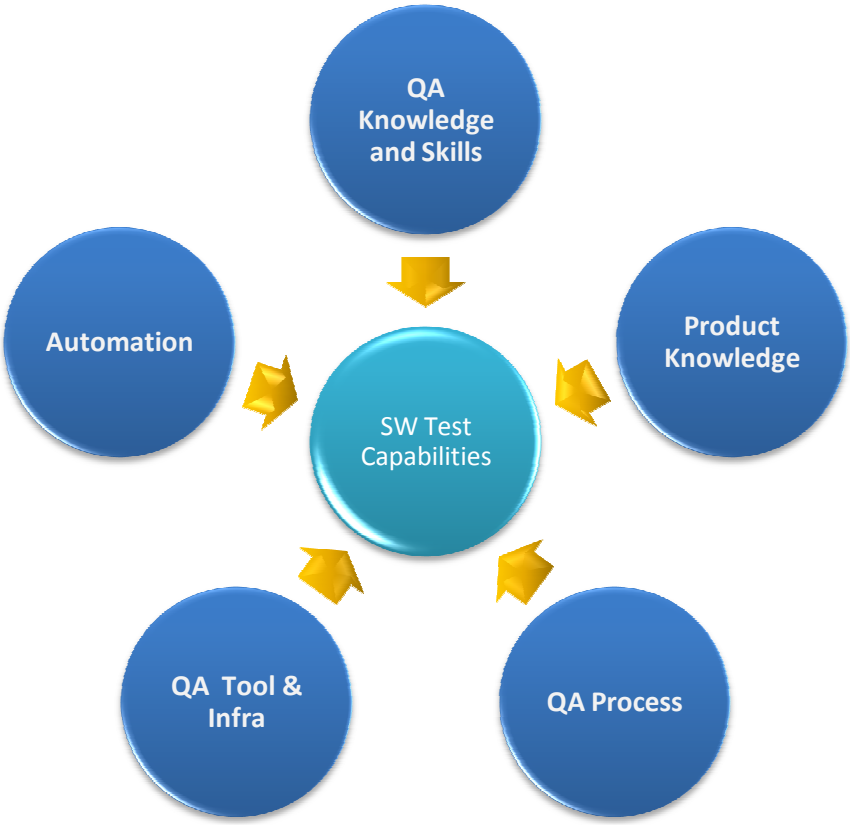
05 Building Software Testing Capabilities

In order to be successful with software testing and add value to the organization, there are five elements to consider:

1. Software Testing knowledge and skills
2. Product knowledge
3. Software Testing processes and practices
4. Software Testing Tools and Infrastructures
5. Software Test Automation



1. Software Testing Knowledge and Skills

Software Testing is a mature skills set where defined knowledge and standard began in 1980s, making it a domain with 30 years of experiences and know-how. Software testing skills set can be categorized into Basic and Advanced.

Basic Software Testing Knowledge and Skills

Basic Software Testing knowledge includes:

- Understanding of the fundamental concepts of software testing
- Understanding of the type and level of testing in different stages of software development life cycle (SDLC)
- Understanding of the black box testing techniques
- Understanding of the techniques and processes to plan, design, prepare test cases
- Understanding of the process to execute test cases
- Understanding of the technicality in setting up test environment and acquire test data

These knowledge and skills will be able to fulfill all manual testing for functional test, regression test, smoke test and user acceptance test.

Advanced Software Testing Knowledge Skills

Advanced Software Testing knowledge includes:

- Understanding of test management and reporting
- Understanding of performance and load test
- Understanding of automation test
- Understanding of usability test
- Understanding of the technicality in setting up test environment and acquire test data for complex testing

These knowledge and skills will be able to fulfill the need for effective managing test resources and projects, as well as perform advanced testing as needed, as not all software needed performance test, usability test or are suitable for automation test, however these specialized tests will contribute to long term stability and maintainability of the applications.

Basic and Advanced software testing skills will provide a total software test approach in ensuring applications are evaluated from both functionality and usability aspects while maintaining effectiveness and efficiency. Ideally, a software test team should have a mixture of knowledge from both basic and advanced to be able to operate in an optimal level, providing opportunities to learn and progress.

2. Product Knowledge

Software test engineers will require holistic product knowledge as testing view the application as whole instead of individual small modules. Strong product knowledge and end-user perspective ensure appropriate software testing assessments to fulfill testing requirements. Such knowledge will allow software test engineers to:

- Design effective test cases
- Execute test efficiently
- Identify errors correctly

Unique software test perspective further value add by contributing ideas to overall software quality improvements through implicit requirements which only comes through usage experiences.

3. Software Testing Processes and Practices

Everyone needs to know how to do their job efficiently and effectively, it is even more important for software test due to the fact that test results must be trustworthy and can be used for decision making. Hence, it is essential to ensure appropriate process and practices are applied throughout the software testing lifecycle for the best outcome.

Software testing processes and practices can be viewed from internal and external perspectives.

Internal Software Testing Processes and Practices

Within the software test team, processes and practices are defined for:

- Inputs, outputs and methods for test planning
- Inputs, outputs and methods for test design and preparation
- Inputs, outputs and methods for test execution
- Inputs, outputs and methods for test reporting
- Quality control within software test team
- Management and control of test artifacts

Defining these processes and practices will set the level and expectations of the quality of work produced by software test team. It will also allow others external to software test team to review and have confident in the work products of the software test team.

External Software Testing Processes and Practices

Software test team interacts with many external parties, for example (depending on the size of the organization):

- Product management
- Project management

- Research and Development
- Release management

Defined processes and practices will set correct expectations while collaborating with people from various levels and departments, even though communications channels may be complicated, it will maintain the needed the clarify, efficiency and effectiveness for all who work together in the larger context.

These processes and practices defined business dealings within the organization; it should not be confused with personal dealings.

4. Software Testing Tools and Infrastructure

Software test will be much more efficient and effective when supported by tools and appropriate environment.

Software Test Tools

Software test tools can be categorized into:

- Tools which support test management
    - Test Management Tools (management of test cases, test cycle, test results)
    - Defect Management Tools (management of defects and status)
    - Analysis Tools
- Tools which support test execution
    - Diagnostic tools
    - Simulation tools
    - Automation tools

Test Infrastructure

Software test tools and test environment must be located in appropriate management environment. There will be two types of infrastructure:

- Service infrastructure where all test management tools are located
- Testing infrastructure where all test execution tools are located and the actual test environment for test execution
    - Setup to be close to production environment with needed software components interactions and test data
    - Enable errors to be re-produced efficiently
    - Enable multiple build to be tested concurrently

Service infrastructure may be maintained by IT department of the organization in centrally managed IT infrastructure.

Test infrastructure should be allocated by IT department of the organization in centrally managed IT infrastructure, however maintain by software test team. Some organizations decouple test environment management with software test team, though this will streamline IT infrastructure management, but compromise the trustworthiness of test environment as test engineers do not know how test environment is setup and decide if it has been setup correctly.

Well maintained Software Test infrastructure will evolve into software test know-how and historical data which provide great insights for future projects

5. Software Test Automation

Software test automation has become necessity in recent years rather as accessories due to:

- Increase in maturity and availability of automated test tools
- The trend of practicing Continuous Integration (CI) as best practice in software development (especially in the agile world)
- Organization begins to appreciate software quality as a requirement

Test automation is needed commonly for two types of testing:

- Performance or Load testing (where it is impossible to be done manually)
- Regression test which is execute often and in large test environment

It is paramount that automated test results can be trusted and accepted without needing to manually re-test; therefore the following pre-requisites must be fulfilled before attempting to automate:

- System under test is stable
- Relevant test cases are created and baselined
- Test environment is properly maintain diligently
- Automated test scripts development processes and practices are defined and adhered to