



Future Trends in Quality Engineering

Introduction

Software development has been undergoing a lot of innovative and disruptive changes in recent times and the rate of change is expected to increase in the future. Changes are driven by a process that aligns better with business, tools, technology, data and increasing expectations from end users. As a result, Testing is transforming itself into Quality Engineering.

To better understand the impact of changes on Quality Engineering and future trends in Quality Engineering, let us analyze the changing trends and potential disruptors.



Changes Driven by Process



Prominence of Agile: Due to the business demand for faster solutions along with flexibility and high quality in the recent years, Agile has become the mainstream process for software development regardless of the nature of product and size of the project. Agile demands faster feedback—feedback on the code (Quality of the product) and feedback on the outcome (faster go-to-market). Hence faster feedback has become a primary requirement.



DevOps: The key principle of DevOps is that all functions must collaborate seamlessly. This is perfectly in line with the Agile philosophy of cross-functional teams. DevOps is the perfect blend of tools and processes to ensure faster feedback which is a major ask from Agile. Faster feedback is achieved through automation and integration of various aspects of build, deployment and release through Continuous Integration (CI) and Continuous Deployment (CD). It also ensures consistent process across Quality Assurance (QA), Pre-production and Production environment. To achieve continuous delivery, we need continuous testing in addition to CI/CD. Continuous testing is possible only through automated testing, and hence automated testing will become a primary means of testing in software development.

Changes Driven by Tools & Technology



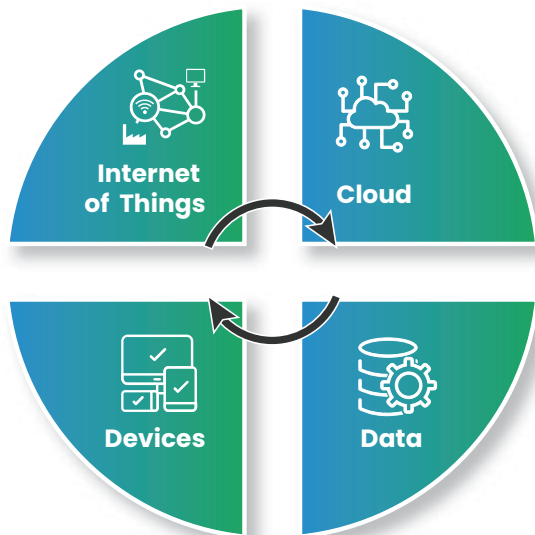
Rise in IoT

Physical devices are connected through the Internet by sharing the information that provides comprehensive insights. Gartner estimates that the connected devices around the world will be over 20 billion by 2020. As the Internet becomes more affordable, gains more speed and reliability, devices from all walks of life are expected to communicate with each other through the Internet to improve productivity and quality of life. IoT would become pervasive and its true potential will be unlocked only if the challenges around security, performance, reliability, compliance and interoperability are solved. IoT devices and applications need to be tested on different parameters as they involve software as well as hardware components, making the IoT testing process very complex. The usual approach of testing may not be successful when testing needs to be done on varied parameters and hence automated testing has a big use case in IoT.

“The new rule for the future is going to be—anything that can be connected, will be connected.”

- Jacob Morgan,
Contributor, Forbes©

Emergence of Cloud



Changing consumer preferences put a lot of pressure on businesses to respond to demands much faster and in an agile manner. Thanks to the emergence of the Cloud, which is making it possible for IT to respond faster. The Cloud offers flexibility, scalability, security and cost-effectiveness to businesses and hence has become the new normal. In conjunction with DevOps, Cloud computing becomes a fast and easy-to-use technology for all types of applications. Ability to deploy powerful systems on demand, continuous monitoring and assurance of security makes Cloud the defacto platform to deploy applications. However, Cloud

applications need to be tested for security, performance and usability apart from functional correctness; hence, automated testing has the main use case in Cloud application testing. The emergence of Cloud is helping businesses go global and support various devices and user preferences that is adding additional responsibility on Quality Engineering to ensure quality, good user experience, security and performance.

Ubiquitous Access Devices

Mobile technology is reshaping society, communications and user behavior. With cell phones, smartphones and tablets now outnumbering desktop computers, there has been a sea change in the way people access, use and share information. Mobile technology is the fastest-growing technology platform in history. A large variation in the hardware, software, form factor, operating systems and underlying technology, along with enormous growth in the number of devices, poses a challenge to test. The explosive growth of variants of OS/ browser/size and their combinations challenge the business goal of faster mobile application delivery with high quality.

Data

As applications and channels grow in number and complexity, the data that emerge from a multitude of connected devices and platforms will increase dramatically. The massive amounts of data generated every day and the application of AI and Machine learning techniques are enabling applications to predict risk, identify opportunities and increase speed and agility. With this vast influx of data, quality engineering will be challenged to produce test data sets that are comparable to real-world scenarios in terms of volume and quality of insightful data. Another challenge would be analyzed to process a large amount of data within a short period of time.

Future Trends in Quality Engineering

The transformation of Software Testing into Quality Engineering already started in response to the above-discussed development in process, tools and technologies. The emerging trends in software development shift towards quality engineering and we expect the future of Quality Engineering will be in the following areas.



Test Automation

The requirement of faster feedback, multi-fold increase in the supported platforms (hardware + OS + browser + size), the enormous increase in data volume along with non-functional requirements like security and performance are making software quality assurance difficult without decent automation. We predict that the future of Quality Engineering will be defined through automation.

Current automation frameworks that deal with script-based approaches are not suitable for the ever-changing consumer preferences and technology transformation. Automation frameworks that pave the way for meta-programming would become mainstream. These frameworks can be backed by AI and Machine learning technology advancements and natural language processing techniques.



Automation Frameworks

Future belongs to the Agile process driven by DevOps. In this scenario, automated testing takes the center stage of quality assurance. To support applications that can be used or deployed on a variety of mobile devices, the applications/devices that share large volumes of heterogeneous data continuously and the applications/devices that use AI and Machine learning heavily will need automation frameworks that transform test automation to become an Automated Quality Assurance Framework.

Future Automated Quality Assurance Framework is expected to take care of:



Quality assurance of DevSecOps that deals with the Cloud environment quality assurance, the security of Cloud and Application Security



Frameworks that will have the ability to gather and analyze data to identify risks and opportunities from the production



Support functional automation across Cloud platforms and Cloud devices preferably as a SaaS offering



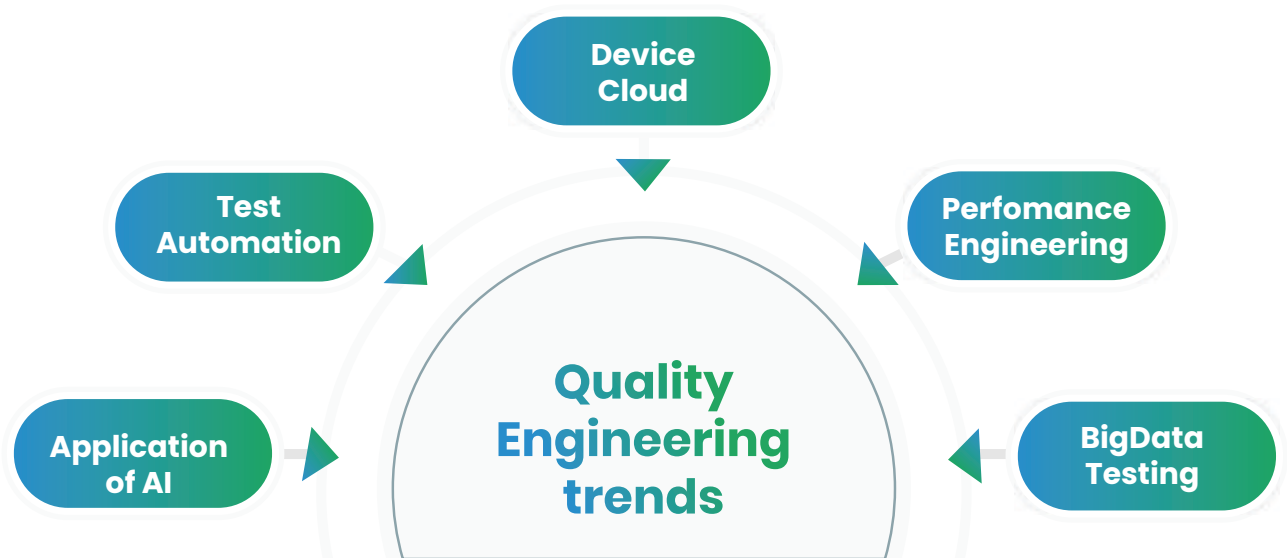
Automated coverage of domain-driven protocols like Hippa for medical devices or LTI for learning systems or standard-driven protocols like RMI, TCP/IP, etc.



Frameworks that have the ability to integrate AI & Machine learning techniques moving from script-based automation to model/pattern-based automation. By doing so, the majority of the automated validation will be accomplished by the framework itself with self-learning and self-maintenance capability.



Application Verification on Device Clouds



A variety of parameters in mobile application testing and device testing (IoT) make Quality Assurance a costly, complex and time-consuming process. Maintaining Test environments and testing across various combinations of OS/browser/device sizes will be a costly and time-consuming process. IoT fuels further complexity as these devices are further needed to be tested from security, performance, reliability, interoperability and compliance perspectives.

Device clouds offered as PaaS solutions featuring hundreds or even thousands of real devices, along with emulators and simulators that support manual, automated and performance testing could solve the challenges; hence, there is a possibility of exponential usage of Cloud devices services in the future. Quality Engineering practice that uses automated testing on Cloud devices will address all important challenges; hence, automated testing on Cloud devices will become the way to ensure quality in the future.



Transformation of Performance Testing to Performance Engineering

Performance of an application is the result of architectural choices, implementation methods and infrastructure choices. Performance testing evaluates performance and identifies performance bottlenecks after the product is built. A proactive approach is to anticipate potential performance issues in business requirements at every stage of the development process.

Performance engineering requires a new way of thinking, tools, capabilities and application of latest technologies to predict performance and prevent performance slippage. The job of performance engineering is to analyze the requirements from a performance standpoint to identify potential performance issues, consistently measure and monitor performance throughout the application life cycle. Rapidly changing user behavior and decreasing tolerance levels of users towards performance will make the transformation of performance testing into performance engineering imperative.



Application of AI

With the extensive application of AI and Machine learning techniques, models based on real-time usage from production can be used to create intelligent test scripts that are capable of self-learning and self-sustenance.

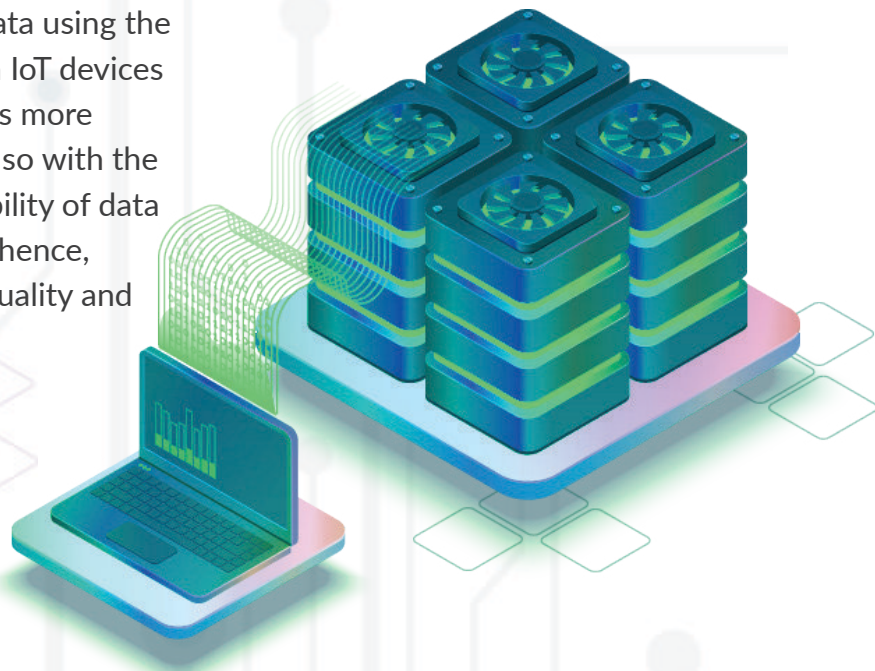
Application of Machine learning techniques on production monitoring data will help predict potential performance issues before they occur. This will help the system take preventive or corrective action in addition to feeding the information to performance engineering framework for preventing future problems.

The application of AI to Quality Engineering will make it more proactive than reactive. Hence, AI will play a critical role in the process, tools and metrics collected by Quality Engineering in the future.



Big Data Testing

Due to exponential growth in the volume of data and variety of data (structured & unstructured), there will be a greater focus on creating test data sets that are comparable to real-time data for meeting quality requirements. Greater focus will be on separating noise from signal in minimum time by analyzing and processing a large quantity of data using the Cloud, edge computing and AI. With IoT devices gaining momentum, data testing gets more complex not only with volume but also with the variety of data. The future and reliability of data analytics depend on insightful data; hence, there will be a lot of focus on data quality and processing in the future.



Conclusion

Agile would become a mainstream process for future software engineering and DevOps would become the primary delivery vehicle. Testing will evolve into Quality Engineering while automation framework transforms into an Automated Quality Assurance Framework that heavily uses AI to support multiple devices, protocols and applications/devices that share a large quantity of data.

Eventually, Quality Engineering will become a front-ending activity that starts with inception and goes beyond deployment.

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Bio:

Naveen is a Sun Certified Java Architect has around 20 years of industry experience. He lead outsourced product development in leadership roles to create world class products. He has been involved in development, test and governance streams of IT projects. He has vast experience in transforming Quality teams across several functional (life sciences, financial) and technical (software infrastructure, Business Intelligence and Reports) domains to make them future ready.

About Relevance Lab:

Relevance Lab is a DevOps and Automation Specialist company, driving frictionless business and enabling large enterprises to disrupt traditional delivery models of Infrastructure Management, Application Development and Service Delivery Operations with faster velocity, better quality and optimized spend using new technology. Relevance Lab is a partner of choice for a number of large enterprises and technology companies globally in their adoption of Cloud Computing, Big Data Analytics and Digital Solutions for their business transformation initiatives

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