



BUILDING BETTER TOGETHER: THE SYNERGY BETWEEN QE, SOFTWARE 2.0, AND GEN AI



Imagine a future where software development is revolutionized, where platforms understand your intent and write code based on your descriptions. This is the promise of Software 2.0 and generative artificial intelligence (Gen AI), a powerful combination poised to shift the traditional paradigm of programming.

With Software 2.0, development will be streamlined as repetitive tasks are automated and functionalities integrated. Gen AI further enables Software 2.0—Software 2.0 over Gen AI analyzes existing code and user requirements to generate new functionalities, significantly reducing development time and errors. This signals a future where development is faster and more efficient, and

developers can focus on more complex endeavors. It's a future that holds great promise.

Moreover, the AI revolution extends beyond development, with profound implications for Quality Engineering (QE) teams. As AI, especially Gen AI, takes root in coding, the testing landscape undergoes a necessary transformation.

This viewpoint is about more than just exploring the potential impact of Software 2.0 and Gen AI on QE and discussing the emergence of newer dimensions in software testing. It's about the urgency of understanding Software 2.0, a crucial shift in the industry, and staying informed and prepared.



Decoding Software 2.0 – A New Frontier

In response to the ever-growing complexity of modern software development, traditional methods began to strain under the weight of constantly evolving applications. This frustration fueled the vision for Software 2.0, a paradigm shift spearheaded by a trailblazing paper from Andrej Karpathy in 2017. Karpathy proposes moving away from traditional languages (C++, Java) in favor of deep learning models that generate code based on user input. Existing AI models like GPT-3 show promise, hinting at a future where AI is at the helm of software development. These advancements have tremendous implications for the enterprise software landscape.

We're transitioning from a landscape with bespoke and packaged software to a future dominated by AI components. Before that entirely unfolds, a bimodal model may emerge - traditional coding for core functions and Software 2.0 for peripheral aspects. Tools like Copilot can bridge this gap, boosting developer productivity. Some Infosys clients are already adopting this approach. But before that happens, and even within this evolving landscape, the impact on QE and how it develops in response becomes even more critical.

Software 2.0: A Catalyst for the Evolution of Quality Engineering

The rise of Software 2.0 sparks a dual transformation within organizations, redefining the landscape of QE.

AI for QE: Redefining Testing Efficiency

Firstly, it ushers in the era of "AI for QE," utilizing the power of Gen AI to supercharge efficiency across the entire testing lifecycle. While AI is no stranger in the QE realm, Gen AI unlocks a new level of automation, achieving elevated optimization levels.

AI/ML algorithms have solved simple QE problems for a few years. For example, AI clustering algorithms can quickly identify redundant test cases and significantly lower testing time and effort. Another application is defect analytics, where AI algorithms can help QE teams swiftly narrow down the hot testing spots based on production logs. However, the entry of Gen AI has raised the bar to an entirely new level.

For example, it can handle the review of static requirements and check code quality. That's not all. Automated scripts or role-based business scenarios developed from user stories, legacy automation seamlessly translated into modern languages, and comprehensive test data meticulously crafted to cover every possible corner case are now a reality. These scripts can quickly and seamlessly convert to open-source Selenium. Furthermore, synthetic data generation is catching favor as Gen AI can deliver more accurate data despite various boundary conditions. Clearly, Gen AI can competently solve complex problems in QE. But there's more it can do.



AI-powered Automation for Faster and More Accurate Testing

A prominent financial institution in Australia and New Zealand offering a comprehensive suite of banking solutions, it was keen to elevate its testing performance levels. The bank sought to improve the testing lifecycle's productivity, accuracy, quality and speed.

Infosys worked closely with the bank to enable Git-Hub Copilot adoption and set the guidelines to achieve the best QA outcomes. Infosys deployed a multi-functional team that brainstormed with the client to develop use cases. In addition, the team provided elaborate how-to guides and best practices to get the best results from Copilot. Use cases include creating BDD (feature file) from test case or scenario tags, generating Selenium Java scripts from BDD, generating test data from Excel to JSON, and code summaries.

This collaboration delivered many benefits, including successfully championing Gen AI adoption through Copilot in QA and achieving 90% accuracy in test artifact generation. In addition, efficiencies improved with a 60% drop in test planning efforts in the BDD framework and a 15% decrease in test script generation efforts. Finally, the bank saved over \$250000 in test planning efforts annually and achieved 10% cost savings in the QA portfolio without compromising compliance.

QE for AI: Ensuring Seamless Integration and Performance in the AI-Driven Landscape

Software 2.0 also paves the way for "QE for AI," a specialized discipline focused on testing AI models and their smooth integration with the broader system to ensure a harmonious yet complex AI-driven landscape. IT consumers like the CFO or business units expect the system functionality to work as per their business requirements. Having AI or legacy components in the background is not a concern for them. Therefore, ensuring end-to-end business process flows remain unaffected when AI is introduced is critical.

In other words, a robust testing framework for AI models is needed to ensure the smooth running of business processes. The stakes are high - the performance of these models hinges on the quality

of their training data. Here, QE teams can help tackle critical risks like AI hallucination (where models generate unrealistic outputs), inherent biases, data privacy concerns, and security vulnerabilities, ensuring high performance and reliability.

In addition, QE teams must consider explainability, responsible AI, and regulatory compliance. Explainability tools help understand AI models' reasoning and decision-making. Responsible AI ensures fairness and minimizes bias in the model's outputs. Finally, compliance guarantees that the model operates within industry regulations. Addressing these aspects fosters trust and ethical considerations in Software 2.0's AI-powered landscape.

Harnessing AI for Optimized Workforce Deployment

A large US retailer faced inefficiencies in carton offloading due to reliance on manual data analysis and static rules. This approach lacked automation, resulted in analytical inaccuracies, and lacked a robust testing methodology. The retailer implemented a machine learning model based on simple linear regression to address these challenges and optimize workforce deployment. This model aimed to predict carton arrivals ten days in advance, seamlessly integrating with their existing logistics system.

Infosys partnered with the retailer to redefine its testing approach. We mobilized relevant test data, automated the testing process using our AI Assurance platform, and addressed complexities such as seasonality, weekend trends, and holidays. Synthetic data generation was strategically employed to ensure comprehensive testing even when real data availability was limited.

This collaborative effort resulted in a significant 60% reduction in test cycle time and a remarkable 95% improvement in model accuracy. This case study exemplifies the efficacy of utilizing AI in testing methodologies to optimize operational efficiency within the retail sector.

Building a Better Future

Software 2.0 and Gen AI present a new frontier for QE. These advancements won't replace human expertise; instead, they'll empower quality engineers to focus on higher-level tasks demanding human intuition, empathy and problem-solving. Just as in "AI for QE," where Gen AI unlocks a new level of automation and optimization across the entire testing lifecycle, freeing QEs from repetitive tasks. At the same time, Software 2.0 triggered the rise of "QE for AI," a specialized discipline focused on testing AI models and their integration with existing systems.

This symbiotic relationship underscores the importance of both AI for QE and QE for AI, highlighting the transformative potential of their collaboration in shaping the future of software development and quality assurance. Infosys recognizes this potential and is actively exploring the integration of AI in QE.

The call to action is clear: embrace the evolution. By adapting to this new paradigm, QE organizations can collaborate with AI to build better technologies and achieve a future where quality and innovation go hand-in-hand.



About the Author



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Niranjan brings nearly three decades of global experience in consulting, sales, pre-sales, delivery, and operations. He has worked with international clients across industries to help them succeed in their enterprise-wide QE-led transformation journeys. Outside his professional life, he enjoys spending time with family, travel and read about new emerging trends that are impacting the society.

Infosys Topaz is an AI-first set of services, solutions and platforms using generative AI technologies. It amplifies the potential of humans, enterprises and communities to create value. With 12,000+ AI use cases, 150+ pre-trained AI models, 10+ AI platforms steered by AI-first specialists and data strategists, and a 'responsible by design' approach, Infosys Topaz helps enterprises accelerate growth, unlock efficiencies at scale and build connected ecosystems.

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