

Transforming Quality Assurance and Testing with Agentic AI



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In the rapidly evolving competitive landscape, organizations are constantly seeking ways to enhance their operational efficiency, governance, and agility. As we look towards the future of software development and testing, a new paradigm is emerging that looks to revolutionize the way organizations approach quality assurance (QA) and testing: Agentic AI.

The Evolution of AI in Software Testing

IDC finds that 1 in 2 organizations are expanding their use of, currently using, or piloting AI/ML to augment testing processes. Among the software development life cycle stages, software testing has taken the lead in the use of AI/ML, including GenAI. Massive increases in code volume and staffing constraints demand test prioritization, focusing on both value and risk. IDC research showed that **for 70% of developers automatically generating code, more than 40% of the code needed remediation**. As GenAI and AI become infused into code, they must also be tested in new ways. These demands are fuelling adoption for test automation and driving the rapid incorporation of advancements in GenAI and AI for more autonomous testing with AI agents, agentic workflows, and imperatives for orchestration and governance.

The AI of our days: from predictive to generative to agentic AI

As stated above, the journey of AI in software testing has been marked by significant milestones. There has been the rise of predictive AI, followed by the transformative impact of generative AI. Now, there is the next significant advancement: agentic AI. This third wave of AI technology represents a fundamental shift in how testing strategies are conceptualized and implemented.

What is agentic AI?

Agentic AI possesses the ability to operate autonomously within a defined environment. IDC defines AI agents as LLM-powered autonomous software entities that perceive their environment, make decisions, act upon them, and interact with users or other systems independently or under supervision. AI agents can gather data, formulate plans, execute decisions, and process information without constant human intervention. This level of agency opens up significant possibilities for enhancing the software development lifecycle, particularly in the realm of QA and testing.

IDC research indicates the current adoption of agentic AI in business and technology use cases is embryonic. According to IDC's 2025 Future Enterprise Resiliency and Spending (FERS) Survey, Wave 1, 40% of organizations globally are doing initial testing of agentic AI solutions and focused proofs of concept but don't have a set spending plan in place. Furthermore, just over a quarter of organizations indicated significant investment in agentic AI, with established spending plan for training, acquiring agentic AI-enabled software, and consulting services.

What's clear is that the expectations from agentic AI are high, with a third of organizations expecting agentic AI to disrupt their current business models this year or to do so in the next 18 months.

The Agentic AI Advantage in QA and Testing

IDC research indicates that organizations are facing significant challenges in their QA and testing efforts. Nearly 70% of organizations initiated digital transformation programs more than three years ago, yet business agility in software delivery remains an unsolved challenge. Only one in four organizations currently apply iterative development models to more than 60% of their software development activities. With digital acceleration powered by Apps and AI now top of corporate agendas, the pressure on software development and delivery accelerates.

Agentic AI has the potential to address these challenges head-on. By automating complex testing processes, agentic AI can significantly reduce the reliance on manual processes, which according to IDC is cited as one of the three biggest pain points challenging software delivery teams.

Key Capabilities of Agentic AI in Testing:

- **Autonomous test generation:** Agentic AI can analyze requirements, user stories, and system behavior to autonomously generate comprehensive test cases, ensuring broader coverage than traditional methods.
- **Adaptive test execution:** As the AI executes tests, it can dynamically adjust the testing strategy based on real-time results, focusing on areas that require more attention.
- **Intelligent defect analysis:** Agentic AI can not only identify defects but also analyze root causes and suggest potential fixes, significantly reducing the time spent on debugging.
- **Continuous learning and improvement:** Through its ability to learn from each testing cycle, agentic AI continuously refines the testing strategies, leading to ever-improving efficiency and effectiveness.

The Impact on Software Development Lifecycle (SDLC)

The introduction of agentic AI into the software development lifecycle is expected to significantly enhance each stage:

- **Requirements analysis:** Agentic AI can assist in creating more precise and testable requirements by analyzing historical data and predicting potential issues.
- **Design and development:** It can suggest optimal architectural decisions and identify potential design flaws early in the development process.
- **Testing and QA:** This is where Agentic AI has the possibility to excel in providing comprehensive, autonomous testing that dynamically adapts to the changing software landscape.
- **Deployment and maintenance:** Agentic AI can evaluate potential issues in production environments and suggest proactive quality improvements to optimize deployments and software operations.

Challenges and Considerations

While the potential of agentic AI is notable, organizations must be prepared to address several key challenges when it comes to implementing and using agentic AI. When asked about their greatest Agentic AI integration challenges, four in ten organizations expressed concerns about increased business, regulatory and data control risk exposure. Key considerations around Agentic AI implementation include:

- **Data quality and management:** The effectiveness of agentic AI heavily depends on the quality and relevance of the data it's trained on. Organizations need to ensure robust data management practices.
- **Integration with existing systems and workflows:** Seamless integration of agentic AI with existing development and testing tools and workflows is crucial for realizing its full potential.
- **Skills gap:** To ensure AI agents behave in the way they are supposed to, there is a need for qualified professionals who can effectively work alongside, supervise and guide agentic AI systems as suggested in the AI Literacy Act introduced 2nd February 2025. Lack of agentic AI expertise is cited by 37% of organizations as a challenge to integrating it into business processes.
- **Security, compliance, and data protection:** Agentic AI increases the complexity of the software stack while many enterprise processes need to remain deterministic in nature. This requires new approaches to security (such as Agent2Agent and Model Context Protocol) and ensuring that enterprise data remains firmly protected and compliant with emerging standards such as the ISO 42001.
- **Ethical and governance concerns:** As AI agents become more autonomous, organizations must establish clear oversight mechanisms to ensure responsible and compliant Agentic AI operations. The Future of QA and Testing with Agentic AI

Looking to the future, it becomes clear that agentic AI will play a role in shaping the landscape of QA and testing. IDC research shows that organizations are already prioritizing areas that align with the capabilities of agentic AI, and unsurprisingly improving levels of automation is the top area prioritized to drive continuous quality assurance and testing excellence.

As a result, organizations intend to increase investments in the quality of their digital assets:

- 45% of decision-makers planned to increase spending on software testing in 2024.
- 35% of these decision-makers anticipate increasing that spending by more than 10%.

Continuous, agile testing is now an integral part of the SDLC. Prioritized testing, which includes value-centric planning and strategic portfolio management, benefits from AI leverage. This approach ensures visibility for both developers and business stakeholders across all SDLC phases.

The potential for agentic AI to improve quality and SDLC workflows is significant; IDC research indicates that developers automate testing for less than half of applications, at around 44%. The

ROI from transitioning to automated testing considering cost efficiencies, risk mitigation, early identification of problems, and faster software deployments is substantial.

The ways in which agentic AI can impact QA and Testing include:

- **Enhanced test coverage and efficiency:** By autonomously generating complex test cases spanning various workflows and integration points, agentic AI has the potential to significantly improve test coverage. As these systems become capable in analyzing requirements, user stories, and system behavior, testing teams will be able to expand tests to cover a wider range of scenarios than traditional methods. The key benefits stem from the ability to run more thorough testing with less manual effort.
- **Adaptive testing strategies:** Thanks to its planning and decision making engine, agentic AI can dynamically adapt and adjust testing strategies in real time based on output. Depending on guidelines, requirements and testing results, these systems can re-focus execution on areas that require deeper optimization.
- **Defect root cause analysis and proactive resolution:** Unlike previous AI capabilities in testing focused on identifying defects, agentic AI systems bear the potential to capture and analyze defect root causes owing to their networked capability to dig deep into trees of process dependencies. Beyond identifying the causes, these systems can autonomously fix defects or suggest potential fixes to their human supervisor.
- **Continuous learning and improvement:** Through its ability to learn from each testing cycle, agentic AI can continuously refine its testing strategies. Furthermore, this can help human testers in various ways, including improve their own skills and understanding of system dependencies, improve QA effectiveness and productivity.
- **Rewiring the SDLC with automation and human-machine collaboration:** Agentic AI presents software delivery teams with new opportunities to automate and optimize workflows across the SDLC. Human testers can lean on agentic AI environments to assist in requirements analysis, drive optimal architectural decisions, and identify potential design flaws early in the development process. Furthermore, the human – AI agent quality improvement collaboration can extend beyond the SDLC and into the business, where AI agents enable non-technical developers and users to become citizen testers. Agentic AI has the potential to democratize testing of digital assets beyond the software development and delivery function.
- **Multi-AI agent testing environments:** Beyond productivity improvements resulting from Human-Machine collaboration, multi-agent multi-environment collaboration presents organizations the prospect of further efficiencies and improvements in the quality process. Collaborative AI ecosystems, where multiple AI agents work together to test complex, interconnected systems emerges as a next-phase for organizations that operate in a mature fashion fleets of AI agents. This approach can be particularly valuable for testing large-scale, complex enterprise applications and IoT environments.
- **Enhanced UI and UX testing:** Agentic AI is well placed to enhance UI and UX testing by leveraging computer vision and natural language processing. Such capabilities enable AI Agents to interact with applications just like human users, providing the background for comprehensive testing of user interfaces across various devices and scenarios.

- **Autonomous end-to-end testing:** As organizations become more comfortable with agentic AI environments, and outputs become more deterministic and well guard-railed. These systems can be gradually enabled to perform end-to-end testing with a very high degree of autonomy, ranging from test case generation to execution and reporting. This builds the prospect for true "lights-out" testing operations, with implications for software delivery agility, especially in continuous deployment pipelines.

To summarize, Agentic AI represents a paradigm shift in QA and testing, promising new levels of efficiency, coverage, and intelligence. As this technology matures, it will transform the approach to software quality and redefine the role of human testers in the development process. Organizations that successfully integrate agentic AI into their QA strategies stand to gain a competitive advantage in delivering high-quality software products at speed and scale.

Recommendations for Organizations

To prepare for and leverage the power of agentic AI in QA and testing, organizations should consider the following steps:

- **Assess Current Testing Practices:** Evaluate your existing QA and testing processes to identify areas where agentic AI could have the most significant impact.
- **Invest in Data Infrastructure:** Ensure your organization has robust data management practices in place to support the data-hungry nature of agentic AI systems.
- **Upskill Your Workforce:** Begin training programs to equip your team with the skills needed to work effectively with agentic AI systems.
- **Start Small, Scale in Line with Demand:** Begin with pilot projects to demonstrate the value of agentic AI in your specific context, then rapidly scale successful implementations.
- **Foster a Culture of Continuous Learning:** Encourage a mindset of ongoing adaptation and learning to fully leverage the evolving capabilities of agentic AI.

Conclusion

Agentic AI has the potential to revolutionize QA and testing approaches. By embracing this technology, organizations not only can address current challenges in software development but also position themselves at the forefront of digital quality and innovation. As this new era unfolds, those who successfully integrate agentic AI into their QA and testing processes are placed to gain a notable competitive advantage in the rapidly evolving digital landscape.

The future of QA and testing is autonomous, adaptive, and intelligent. Agentic AI bears the promise to be more than just a tool; its transformative potential can reshape the execution of quality assurance in the age of Apps and AI everywhere. Organizations that recognize and act on this potential will be well-positioned to take-on the next phase of digital acceleration.

About the Analyst

Jennifer Thomson, AVP AccAD, Cloud, Services Research Europe

Jen Thomson has more than 20 years' experience advising IT Vendors, senior IT, and business execs on their digital business optimization and transformation strategies. She leads European Research for Accelerated App Delivery, Cloud, and Services. Her core goal is to drive synergies and growth across these research areas, with a central focus on thought leadership.



Thomson specializes in providing insights on the investment strategies and decisions of European enterprises as they transition to modern application architectures. Her research explores app dev and delivery capabilities required to operate in a digital economy, and how this impacts enterprise organizational structures, culture, processes, tools, and skill sets. She leads the Future of Digital Innovation research for IDC Europe, exploring software innovation strategies and what this means in terms of end-user strategies, investment priorities, software sourcing, and KPIs. Thomson's core research also explores enterprise maturity and strategies towards enterprise scale and empowered DevOps.

Thomson is responsible for the execution of a broad range of consulting and advisory projects. As IDC's European expert on application development and delivery strategies, Thomson is an experienced public speaker and regularly presents at conferences and IDC partner and end-user events.

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George Mironescu leads various software development and engineering research streams, covering areas such as modern application delivery environments, developer and software engineering tooling, software delivery pipelines and practices, cloud native frameworks, emerging technologies and methodologies pertaining to today's and tomorrow's software delivery lifecycle.



In his role, he examines the needs, challenges and pain points facing organizations as they strive to mature their software delivery engines. This includes research on the evolution of maturity levels, adoption strategies, and persona attitudes. He also closely follows vendor portfolios and strategies, including product and portfolio capabilities, product/portfolio development efforts and investment roadmaps. He advises clients on a range of tactical and strategic options, including sourcing, capabilities, competitive choices and positioning.

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