



Channeling the Urgency of the Battlefield

Command and control testing

Overview

In 2022, the US Department of Defense (DoD) approved its **Digital Modernization Strategy**, with the goal to evolve faster and be more adaptable than our adversaries. The DoD's adaptability increasingly relies on software, and the ability to securely and rapidly deliver resilient software capability is a competitive advantage that will define future conflicts.

DoD Instruction 5000.87, **Operation of the Software Acquisition Pathway**, is designed to reengineer technology procurement and deployment for the modern age. The policy introduces numerous changes, including the ability to buy and deploy iterative software rather than wait for a custom code.



Software Acquisition Pathway: All Roads Lead to Test Automation

According to the DoD mandate, government and contractor software teams are required to use modern iterative software development methodologies, tools, techniques, and human-centered design processes. This will enable teams to deliver software that meets the users' priority needs on a consistent basis.

It is simply impossible to embrace this modern approach to software development without modernizing the testing environment.

DoD Instruction 5000.87 also mandates automated testing, stating, "automated testing and operational monitoring should be used as much as practicable for user acceptance and to evaluate software suitability, interoperability, survivability, operational resilience, and operational effectiveness."

With this approach, the DoD has greater flexibility in acquiring goods and services better aligned with users' needs. This framework sets in motion a technology and process transformation that give the DoD resilient software capability delivered at the speed of relevance.



Command and Control Systems Demand Test Automation

Any organization that manages Command and Control (C2) systems should focus on optimizing to enhance and strengthen your technology's performance. These activities cannot happen without test automation.

Programs will require teams to use modern iterative software development methodologies, leading-edge tools and techniques, and human-centered design processes to iteratively deliver software to meet the users' priority needs.

Test Automation Snapshot

Why is test automation's role in digital transformation and modernization so important?

According to **Gartner**, "By 2025, organizations that ignore the opportunity to utilize AI-augmented testing will spend twice as much effort on testing and defect remediation compared with their competitors that take advantage of AI."

Test automation enables companies to move beyond the limitations of manual testing to eliminate issues associated with human error and redundancies. As a result, organizations can:

- Accelerate testing and shorten test cycles.
- Increase test coverage.
- Scale automation across complex environments and systems.
- Monitor and improve their technology's performance, functionality, usability, and utilization.

Given these benefits, **90% of IT leaders point to test automation as the most critical factor in accelerating innovation.**

The Case for Continuous Testing

A key benefit of test automation is the ability to continuously monitor the technology environment. **More than 50% of application development teams implement continuous testing to ensure they can release faster without sacrificing quality.**

This approach is a priority in the public sector, as well, with the DoD mandate stating:

“The chosen software development methodology will incorporate continuous testing and evaluation... with maximum possible automation... throughout the entire lifecycle.”

Continuous testing is critical, particularly for C2 technologies that typically span:

- Multiple systems
- Locations
- Operating environments
- User groups

These variables could easily lead to software errors or quality issues. In mission-critical situations, this simply is not an option.

User-Centric Testing

The need to test technology from the users' perspective is another driver of test automation in the aerospace and defense sector. Any number of factors could affect technology performance, among them:

- Device type and available bandwidth
- Battery consumption
- Integration and interaction with other software or applications
- Users' emotional state

The DoD mandate stresses the importance of collaborating with users throughout the software life cycle to understand their needs, existing technology deficiencies, and how to optimize software to address these gaps. From a testing perspective, this means eliminating the traditional focus on code and replacing it with how users interact with the technology.

AI: The Common Denominator

So, how can you embrace test automation while prioritizing continuous user experience testing? In a word, Artificial Intelligence (AI).

Advances in AI made first-generation test automation possible. Today, technology has matured significantly to enable organizations to continuously test the quality of the users' experience.

According to Gartner: "By 2024, three quarters of large enterprises will be using AI-enabled test automation tools that support continuous testing across the different stages of the DevOps lifecycle."

Looking at C2 technology specifically, an intelligent, AI-driven approach to testing is key to overcoming traditional roadblocks and truly modernizing the technology environment.



Testing the Future of C2 Technology

With intelligent, AI-driven test automation, organizations in the aerospace and defense industry can perform various activities.

Test fragmented environments

Modern test automation solutions enable organizations to efficiently test any technology, operating system, device, or platform, at any layer — often from a single script. In addition, the framework can easily scale to accommodate innovations in the cloud, AI, machine learning, and the IoT.

Test without accessing IP

Penetrating the application or accessing source code can inadvertently introduce numerous vulnerabilities and potentially expose classified information.

These are risks you cannot afford to take. Several next-generation test automation solutions are graphical-based, enabling them to conduct end-to-end testing without ever touching the source code. This non-invasive capability is critical to meeting the DoD's expectations for security.

Simulate real-life scenarios

Modern testing platforms can use built-in image recognition functionality to react as a user would to specific events in the software, application, or technology. As a result, organizations can simulate conditions that might occur onboard an aircraft, on the battlefield, or in another high-stakes situation. It is critical to test using real-life scenarios to ensure no adverse effects.

Address technology glitches

By combining automated exploratory testing with fixed regression packs, a modern test automation approach enables you to identify and address bugs before release.

Additional benefits of a modern test automation solution include the ability to:

- Access secure applications without having to install them in the system.
- Test any software to ensure interoperability between programs.
- Empower non-developer users to author tests.

Case Study: US Army Suits Up With Test Automation

Battlegrounds are ever-evolving, developing parallel to advances in technology. With computer systems central in today's frontline defense, modern warfighters rely on software to provide time-sensitive intelligence and targeting information to protect against adversaries.

For the US Army Communications-Electronics Command Software Engineering Center (SEC), this critical information reaches the commanders in battle via Joint Tactical Terminals (JTT). A JTT is a family of software-programmable radios often integrated into larger, more complex systems.

Manually testing to validate the solution proved incredibly time-consuming. With such high stakes, the SEC knew it needed to improve its test automation capabilities. After vetting numerous vendors, the SEC chose Keysight Eggplant, a leader in AI-driven automation. In addition to increasing efficiencies, the Eggplant solution enabled the SEC to identify and quickly resolve other previously unknown defects in the software.

The JTT variables, including atmospheric conditions and an antenna's line of sight over the earth's curvature, were not part of the test factors during manufacturing or testing. Eggplant's intelligent test

automation can test thousands of scenarios quickly and scale as the technology matures, making it the best solution to test the SEC's JTT program. Because Eggplant software tests from the user's perspective, unexpected situations in warfare can be simulated to ensure the software performs under all conditions.

As Bennett Dunn, JTT project lead, states: "Given the volume of testing required and the technical complexity, we realized we needed an automated solution. And with Eggplant, we had one available."

Results

Eggplant's intelligent, non-invasive technology solution enabled the SEC to reduce time spent manually testing and ensure safer, more reliable software for our joint warfighters.

Using Eggplant, the team replicated the tests for different scenarios. The SEC team could then execute the tests during off hours to complete multiple test runs without a tester being present. Eggplant enabled the team to move from completing a 10-hour test event every three days to running a 24-hour test event every day.



Mission Success Relies on Test Automation

Your C2 technology design may not be for modern warfare, but that does not mean your testing goals differ from the US Army. It must work as expected if it is mission-critical, and testers only have one opportunity to get it right. Intelligent, AI-driven testing is crucial for organizations to do this effectively. With C2 systems running a million lines of code, teams need an approach that can quickly test this environment and scale as the technology matures. Eggplant provides this comprehensive test coverage while continuously monitoring and refining technology based on how users interact with the application. As the industry's leading completely non-invasive automation tool, Eggplant ensures the security and privacy of C2 technology throughout the testing process.

[Learn more](#) about how Eggplant can revolutionize your command and control testing. Better yet, try Eggplant for free with our [product tour](#), [free trial](#), or [live demo](#).



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