



Talent Takes Flight: How Automation Reshapes AeroDef Tech

**Key trends and projections for software testing
A Keysight study in collaboration with Military Embedded Systems**

eBook

 **KEYSIGHT**



Contents

CHAPTER 1

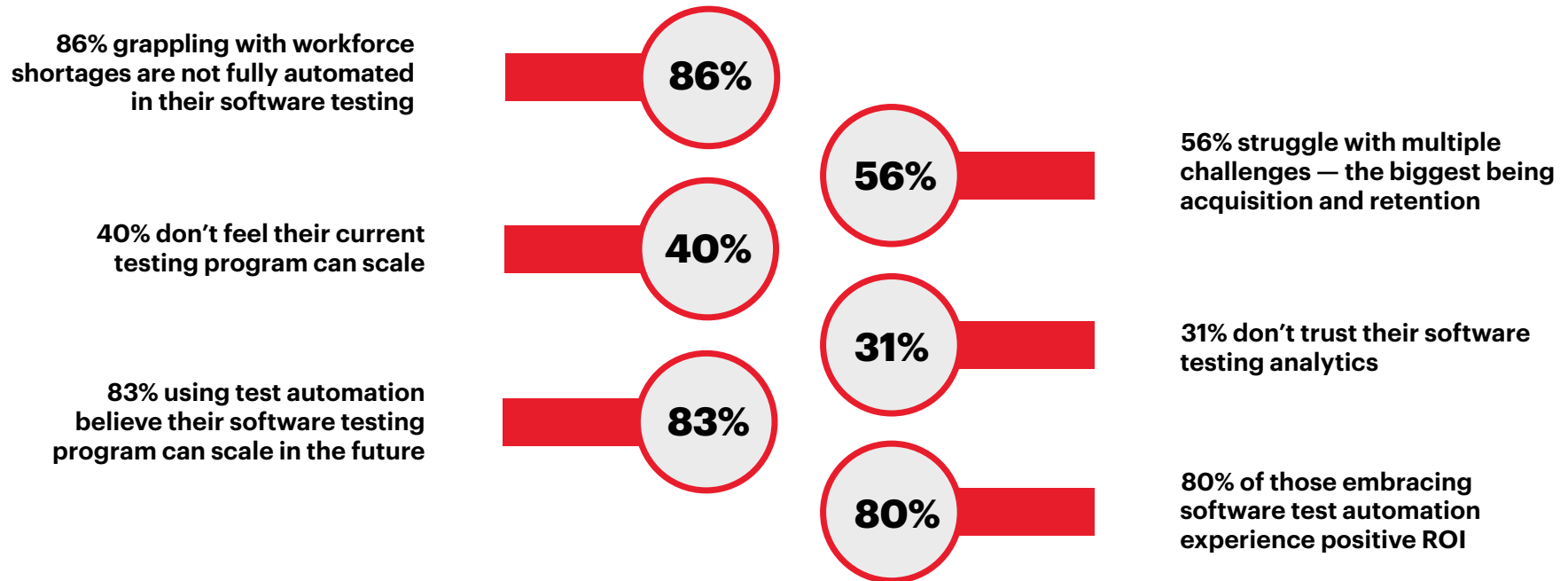
Executive Summary



Executive Summary

Aerospace and defense industry executives continue to struggle with hiring, training, and losing skilled workers. Defense firms see a tighter labor market and higher associated costs taking a toll on sales and profit margins. Teams must juggle staff, organize job fairs, and find workarounds to keep operations running smoothly, even as they ramp up production to meet increasing demand.

In collaboration with Military Embedded Systems, we conducted a comprehensive study involving 100 aerospace and defense industry organizations. This study examined their primary challenges overall — and specifically in their software testing programs. We looked at their software testing methods, outcomes, and strategic plans to uncover insights beneficial to you and your organization.



From this report, we have extracted four essential considerations for effectively addressing the talent shortage using innovative technology like software test automation. By adopting this innovative approach, the defense sector can enhance its ability to attract and retain top-tier talent while ensuring scalability for the future and staying ahead of the technology curve.

Continue reading to explore the insights derived from our comprehensive survey and delve into how these recommendations will help you overcome the challenges our survey participants share.

These recommendations are as follows:



Enhance the appeal of your software testing roles to current and future team members.



Optimize the existing and long-term productivity of your software development team.



Ensure that your tools and capabilities align with the current and future needs of your team.



Establish a comprehensive, long-term plan to scale your DevOps processes in alignment with future requirements.

CHAPTER 2

Study
Demographics

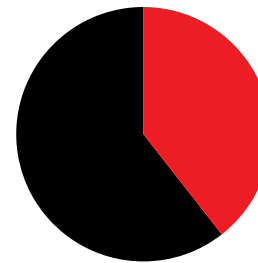


Study Demographics

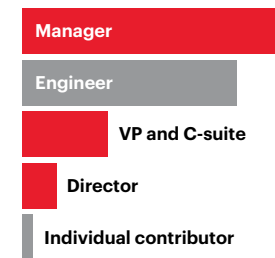
The study analyzes the perspectives of individuals in the aerospace and defense industry who work in or adjacent to their organizations' software development and software testing teams. Respondents work for a diverse range of companies, including aerospace and aviation, defense and military, engineering and R&D services, technology and information technology services, and software development.

The companies, located across the globe, range from multinational corporations to smaller entities. They include avionics, semiconductors, software development, technology solutions, research, and educational institutions. Company size is evenly distributed, but enterprises with less than \$200 million in annual revenue make up over half of the participants.

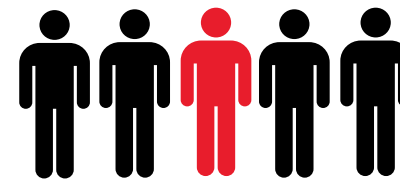
61%
work in IT or
technology
function



75%
hold a position
at or above the
manager level



20%
work for a
defense
contractor



CHAPTER 3

Time and Talent Dilemmas



Time and Talent Dilemmas

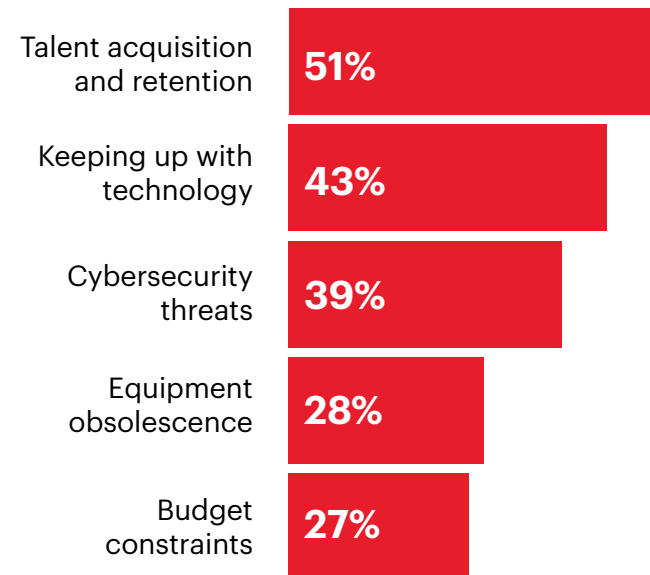
The talent shortage in the aerospace and defense industry poses multifaceted challenges that can impact national security, technological advancement, economic growth, and the industry's ability to meet global demands. Defense contractors' recent earnings reports reveal billions in growing costs due in part to increasing compensation and delayed project completion.

When asked about the biggest challenge in their organizations, most survey respondents cited acquiring and retaining talent. When asked specifically about the biggest challenge in their software testing programs, more than half pointed to finding skilled testers and coders. Interestingly, this was not the biggest challenge for those using a software test automation tool. This is because of the efficiency an automation tool can bring to a testing department, reducing hours spent testing by as much as 90%.

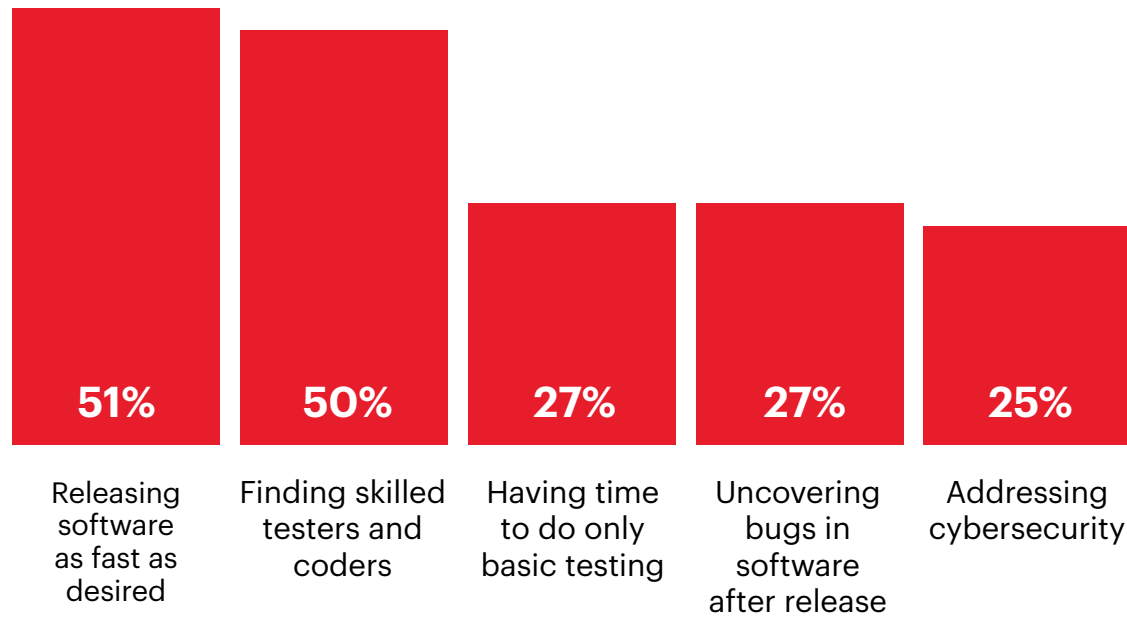
Another leading challenge among participants in software development was not being able to release software as fast as necessary. Further demonstrating how time-crunched testing teams are, the survey shows almost a third of respondents have time to do only the most basic testing.

Aerospace and defense firms are discovering that automation intelligence is a remedy for both the talent scarcity and time pressures they face. Automation also elevates the appeal of testing positions for existing and prospective team members.

Biggest Challenges Defense Organizations Face



Biggest Challenges Defense Organizations Face with Software Development



A software test automation platform reduces the need for manual testing, usually by 90% or more. Testing can take place overnight and on weekends, with no human oversight required. Tests can run in parallel, while manual tests typically run sequentially. By reducing the time it takes to test software, automated testing speeds the software release cycle, sometimes as much as 3X.



NASA uses Keysight Eggplant test automation on the Orion spacecraft.

[Read how in our ebook.](#)

With the rise of low-code / no-code solutions, even an intern can run the most complex software tests. This makes the workforce more efficient, freeing up the most experienced engineers for more critical tasks like innovation and development. Automation also makes the testing job more attractive to potential employees. By removing the repetitive, monotonous task of performing the same tests over and over, automation frees up time to design tests, write new test cases, and debug defects.

Many studies suggest that software test engineers are happier and feel more confident in their work when they have a test automation program in place. There are a few reasons why this might be the case. Automation makes their work more challenging and rewarding. Because automated tests can run repeatedly 24/7, test coverage increases, ensuring thorough software testing. This is especially important for safety-critical software used in defense applications. Knowing their software is being exhaustively tested gives test engineers more confidence in their projects while freeing up their time for more rewarding tasks. Also, by helping improve the quality and release time of software, testers have a greater sense of accomplishment and more time to collaborate with the entire **DevSecOps** team.

Overall, software test automation can be a valuable tool for defense firms that are looking to alleviate the time and talent shortage and release software faster.

Here are some specific examples of how defense firms use software test automation:

- One leading defense contractor uses automated testing to speed up the development and testing of its missile defense systems. It estimates that automated testing has reduced test time by 50%.
- A British defense, security, and aerospace company uses automated testing to help it improve the quality of its aircraft software. It has reduced the number of defects by 30% with automated testing.

As the tech talent shortage continues and the pressure to release software even faster grows, software test automation is likely to become an even more valuable tool for defense firms.



Aerospace and defense organizations have unique challenges when it comes to testing. There's no margin for error when lives and national security are at stake.

[▶ Learn how companies are overcoming these challenges in our white paper.](#)

CHAPTER 4

Testing Trends Unveiled

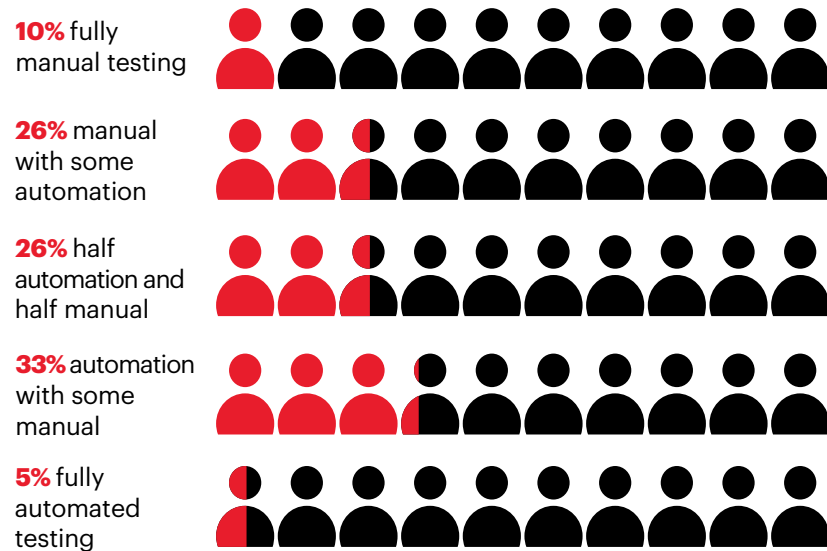


Testing Trends Unveiled

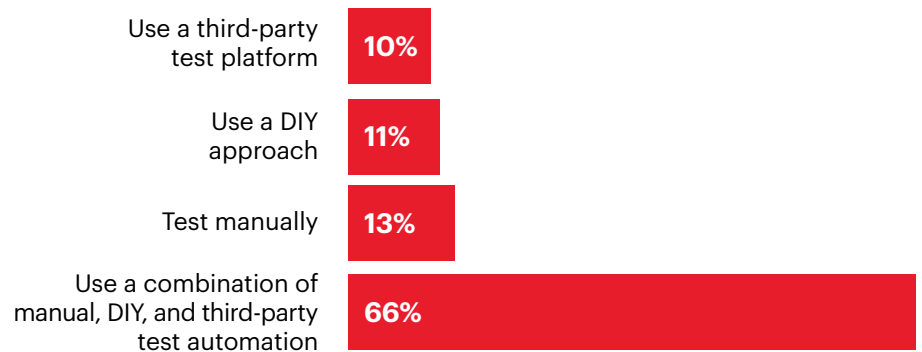
While defense lags other industries in applying software test automation practices, 87% of survey respondents are indeed embracing software test automation. The majority are using some combination of third-party platforms, do-it-yourself (DIY) testing programs, and manual testing. Interestingly, 13% are still only testing manually, which costs organizations time and money and leads to inconsistent and partial testing, undetected bugs, missed security vulnerabilities, and reduced innovation.

In the aerospace and defense industry, 66% of professionals are adopting a comprehensive approach to software testing by using a combination of manual testing, DIY methods, and third-party automation tools during the development phase. Meanwhile, 13% rely solely on manual testing, 11% exclusively employ a DIY approach, and another 10% depend solely on third-party application programs for their software testing needs. This diverse distribution reflects varying strategies where teams adopt new tools and approaches incrementally alongside traditional methods.

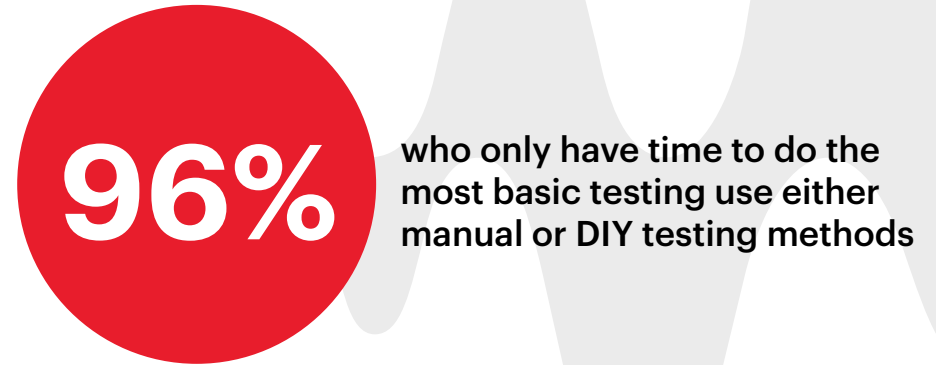
Level of Automation Used for Software Testing



Type of Software Test Solutions in Use



Not surprisingly, 96% who have time to do only the most basic software testing are using manual or DIY testing methods. If an organization is only able to perform the most basic software testing, it could experience significant consequences that impact safety, reliability, efficiency, and overall mission success. Given the critical nature of aerospace and defense systems, comprehensive and rigorous software testing is essential to ensure proper functioning and mitigate potential risks.



The Minefield of DIY

While DIY testing seems like an attractive option with open-source tools and libraries, hidden costs and unforeseen maintenance challenges can make this approach untenable and counterproductive overall. In some cases, testing teams may think DIY is a less expensive option, only to discover that they invariably need additional functionalities requiring custom modules or coding.

One of DIY's biggest hurdles is the requirement of extensive technical expertise and a steep learning curve. What often happens in the military is that one person holds all the knowledge for the homegrown testing system. When that person retires, that knowledge is lost.

According to [Statista Research](#), by 2033, the number of military retirees in the United States is expected to reach 2.37 million, up from an estimated 2.25 million retirees in 2022. This knowledge loss creates a huge learning curve for the new team member, resulting in poorly constructed test cases, incomplete test coverage, and inconsistent results. This could have significant consequences that impact safety, reliability, efficiency, and overall mission success.

Goodbye Grind, Hello Innovation

In the aerospace and defense industry, engineers often harbor concerns about automation encroaching upon their roles. However, the reality is that automation serves as a powerful tool, liberating professionals from mundane tasks and unleashing their potential for creativity and innovation — the very essence of their passion for this field.

Automation transforms engineers from test monkeys into test maestros, enabling them to focus on challenges that fuel their enthusiasm and drive the industry forward. Embracing the automation wave opens doors to unexplored heights of creative problem-solving and game-changing advancements, emphasizing that the future of aerospace and defense involves collaboration between heroes and powerful tools, not the replacement of heroes by robots.

Think of software test automation as a skilled copilot for your engineering journey. Like a driving assistant, it scans the road ahead, warns of potential bumps, and even suggests optimal speed settings. While it can't navigate every hairpin turn alone, it frees you to focus on the horizon, strategize your route, and react to the unexpected. This shared control — human intuition guiding automation's precision — paves the way for a smoother, more efficient testing experience, leaving you free to explore the frontiers of innovation.



Automation Amplifies Success

When precision, reliability, and long-term productivity are of paramount importance, the adoption of software test automation has emerged as a strategic advantage. As industries evolve and technology becomes increasingly intertwined with mission-critical operations, the decision to embrace automation is proving to be not just prudent but highly lucrative. Among those who have embraced software test automation, an impressive 80% report experiencing a positive return on investment (ROI). This statistic underscores the profound impact of automation on improving testing efficiency, ensuring software robustness, reducing costly post-deployment defects, and optimizing short- and long-term productivity.

One US military branch has saved well over \$1 billion by using automated testing to reduce the number of defects in its software. By streamlining testing processes, mitigating human error, and accelerating testing cycles, software test automation is not just a tool. It is a strategic asset that amplifies mission success, fosters innovation, and elevates the overall operational readiness and productivity of these critical industries.



CHAPTER 5

Turbocharged Automation Aspirations



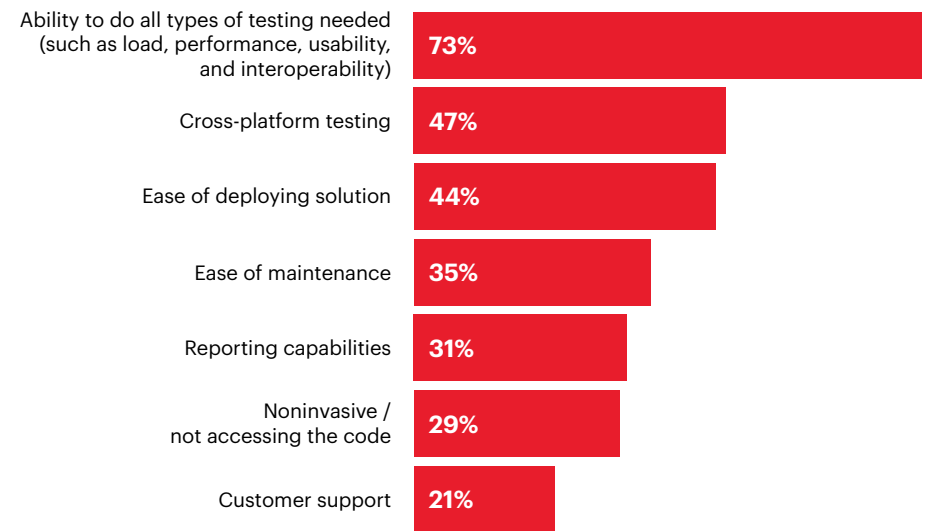
Turbocharged Automation Aspirations

Organizations need to give their teams the tools they need now and plan for what the future holds. Survey respondents say the most important feature they look for in a solution is the ability to do the types of testing they need. These include load, performance, usability, and interoperability testing.

Cross-platform testing — the ability to test across multiple operating systems, devices, or environments — is the second most important feature survey respondents seek. This helps ensure that an application’s compatibility and functionality remain consistent. In an industry where it is crucial to verify that the application performs correctly and consistently on each target platform, this feature is a must-have for most.

Behind cross-platform testing, the ease with which teams can deploy an automation solution is the third most important feature survey participants look for. In an industry where precision, security, and operational readiness are paramount, testing solutions need to seamlessly integrate into existing workflows without disrupting critical operations. A testing platform that is straightforward to deploy and offers adequate customer support and training reduces the strain on valuable resources and minimizes downtime, enabling teams to focus on their core tasks rather than grappling with deployment intricacies.

Most Wanted Features in a Test Automation Tool



Forrester researched, analyzed, and scored the 15 most significant continuous automation testing platforms in 26 criteria. See why it named Eggplant a Leader in the [Forrester Wave Report](#).

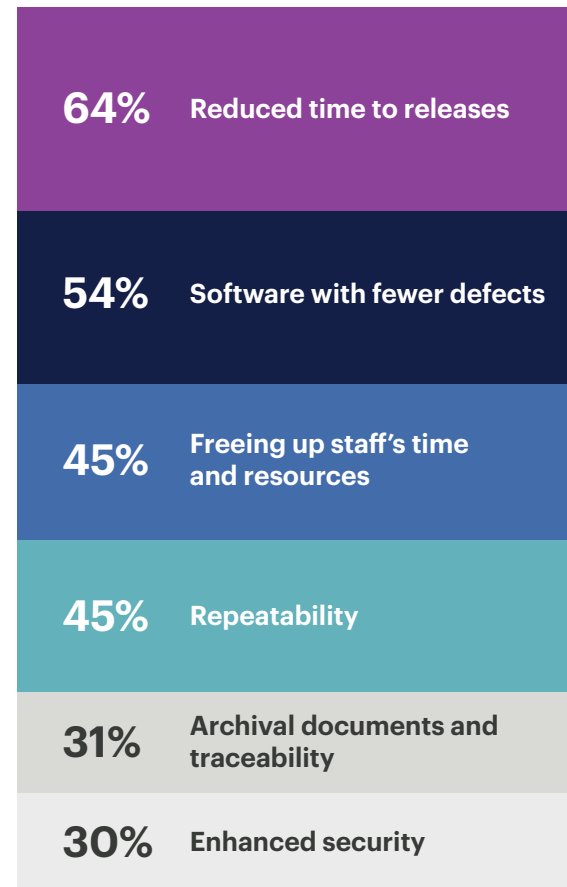
The Need for Speed

Aerospace and defense professionals consider the most critical benefits of test automation to be quicker releases, software with fewer defects, and more staff time and resources.

Reduced time to release, a critical advantage in these competitive industries, is the top benefit of test automation, most respondents say. In the last 30 years, both commercial and defense aerospace programs have increasingly exceeded their projected timelines, according to **BCG**. During the Cold War, defense programs, including aircraft and ships, typically took about five years to develop. Since then, the typical program timeline has expanded to 20 years. Longer-than-expected delivery leads to budget overruns, disappointed customers, and equipment tailored for market and combat conditions that are already obsolete.

Faster software updates mean companies deliver new features, enhancements, or fixes to users and customers more quickly. Driving innovative solutions to the market ahead of competitors is a competitive advantage.

Most Valued Benefits from Software Automation



CHAPTER 6

Trust and Scalability

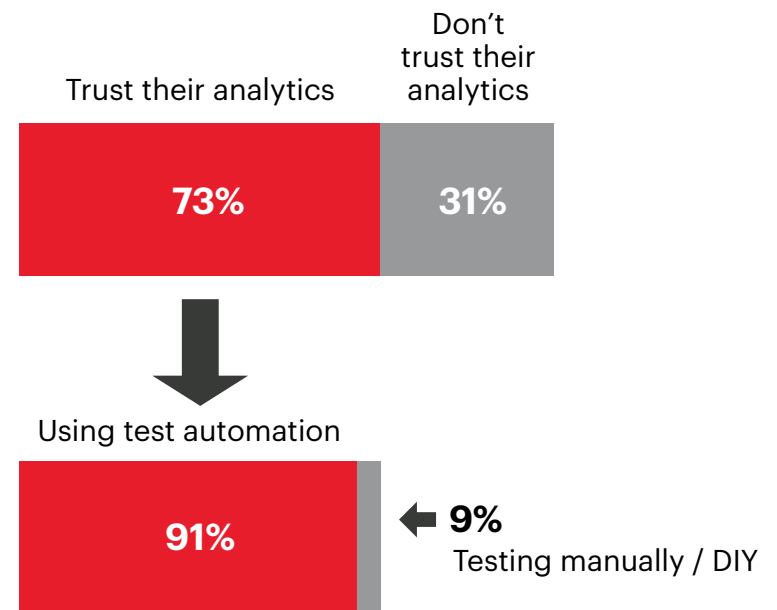


Trust and Scalability

One surprising finding from the survey is that over a third of respondents do not believe their software test solution generates reliable analytics. Trusting the analytics of your software test automation tool is paramount because of its critical impact on decision-making and the overall software development process. Reliability in analytics ensures that you derive accurate insights from testing activities, enabling informed actions and strategies.

Aerospace and defense organizations stay competitive by unlocking the value of data analytics and adapting to new requirements — more effectively and securely than their peers. Test automation platforms can provide reliable, easy access to actionable analytics, allowing quality-assurance (QA) teams to identify issues and develop more effective test cases quickly.

Percentage Who Trust the Analytics of Their Software Test Solution



How Those Who Trust Are Testing

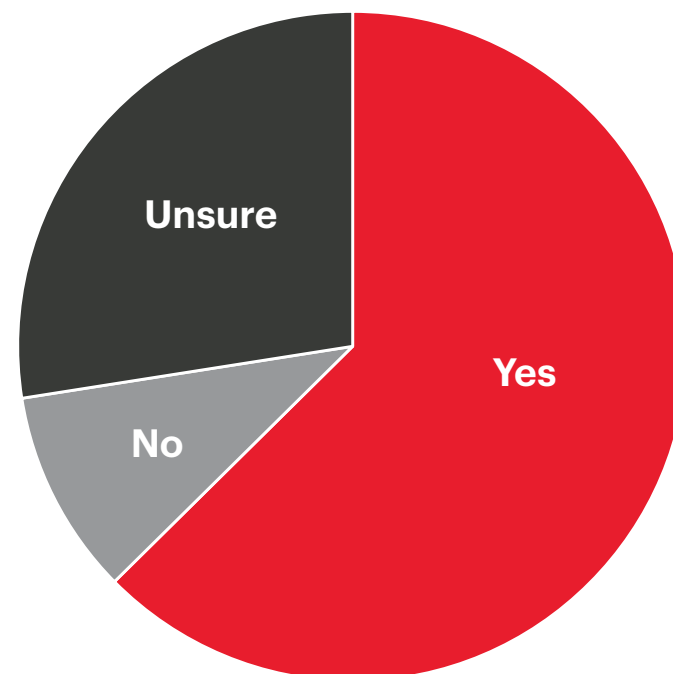
Scalability

Defense and aerospace organizations need a long-term plan to scale their DevOps processes. To scale their software test automation in the future, these organizations must consider evolving technology, intricate systems, critical mission requirements, and effective resource utilization. Scalability ensures that organizations can continue to deliver high-quality software under strict timelines and budgets.

Unfortunately, most US defense organizations cling to traditional software testing approaches created 15 to 20 years ago, inevitably leading to scalability issues. A closer examination reveals that the aerospace and defense industry's heavy reliance on manual and DIY testing methods could be a major contributing factor.

Even simple processes have become complex, often crossing multiple systems and platforms. For example, an altitude calculator for pilots could have thousands of user journeys that need testing. Multiplying this by hundreds of devices, platforms, and operating systems creates massive test requirements that manual or DIY approaches can't handle. Shockingly, the survey uncovered that 40% of all respondents doubt their test automation solution's ability to scale to meet emerging testing requirements. However, 83% of those who believe their solution can scale are using some level of automation.

Proportion Who Believe Their Solution Can Scale to Meet Future Needs

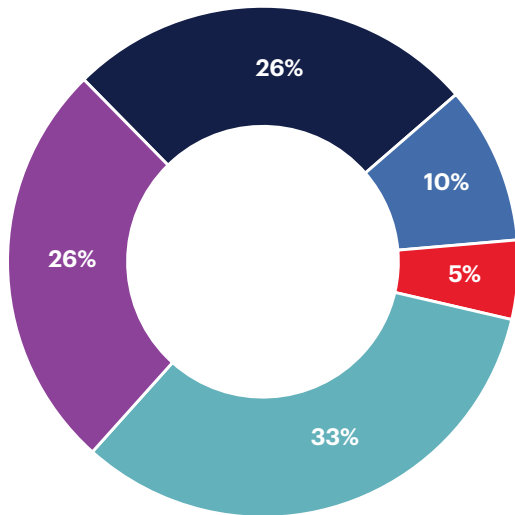


Automation Adoption

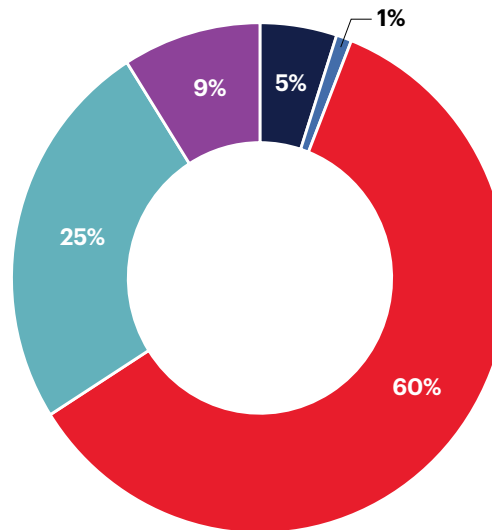
Only 13% of survey respondents are fully automated, yet 60% aspire to be fully automated within five years. Among those aiming for full automation within five years, a substantial 95% already use some form of automation. This suggests that even a preliminary foray into automation can demonstrate the value of automation and prove to stakeholders that the many benefits are worth the investment.

As defense organizations continue to push digital initiatives and pressures continue to increase for fast, bug-free releases, manual and DIY testing approaches will become increasingly unsustainable. QA leaders will face increasing pressure to automate software testing and implement advanced test analytics.

Current State of Respondents' Software Testing



Five-Year Goal of Respondents for Their Software Testing



- Fully manual
- Fully automated
- Automation with some manual
- Half manual / half automation
- Manual with some automation

CHAPTER 7

Recommendations



Recommendations

In summary, for those who are weighing the benefits of moving forward toward more test automation, our four recommendations offer an integrated approach to addressing the top challenges aerospace and defense organizations face.

- 

Optimize development team productivity to leverage automation to streamline testing processes and ensure efficient resource utilization. This empowers your team to allocate their expertise to more intricate tasks, thereby bolstering innovation and advancing your organization's technological prowess.
- 

Elevate the appeal of software testing positions, showing how automation eliminates monotonous tasks and frees up valuable time, helps attract and retain skilled personnel, and bolsters the talent pool.
- 

Align tool capabilities with current and future needs to guarantee that the chosen automation solution evolves in tandem with the organization's growth and technological advancements. This adaptability maximizes the tool's utility and ensures that it remains relevant and effective in dynamic environments.
- 

Establish a comprehensive long-term scaling plan for DevOps processes to provide a roadmap for sustained growth and adaptation. As the industry evolves and requirements change, this plan ensures that automation integration remains smooth, efficient, and aligned with the evolving needs of the aerospace and defense sectors.

In the aerospace and defense industries, every second counts. These recommendations provide a strategic framework for harnessing the power of software test automation to address talent and time shortages, drive innovation, shorten delivery cycles, and ensure the safety of every warfighter and the success of every mission.

Aerospace and defense organizations prefer the Keysight Eggplant solution for environments that require multifactor authentication and ultimate intellectual property protection because Eggplant does not touch the software code. Let us show you how your software development program can reduce testing time by 97%, increase coverage by 300%, and decrease bugs by 100% with Eggplant in a [custom demo](#).



APPENDIX

Methodology

The findings presented in the report draw from an online survey conducted by **Military Embedded Systems** (MES) in June and July 2023. MES collected responses from 100 qualified aerospace and defense industry professionals holding positions in IT and technology or executive leadership. We made every effort to ask

the most relevant questions to the software testing community and share the valuable insights we received from their responses. While we do not present this report as scientific research, these findings can provide helpful information and stimulate further discussions and collaborations on continuous improvement and innovation in this area.

Survey Questions

1. What is the biggest challenge you are facing today in your defense industry organization?

- a) Keeping up with technology advancements
- b) Budget constraints
- c) Cybersecurity threats
- d) Talent acquisition and retention
- e) Equipment obsolescence

2. What is the biggest challenge today in your software testing program?

- a) Releasing software as fast as required
- b) Bugs in our software once we release
- c) Only having time to do the very basic testing
- d) Finding skilled testers and coders

3. How are you testing your software?

- a) Using a third-party test automation platform
- b) Using a DIY approach
- c) Using manual testing
- d) Using a combination of these

4. What percentage of your software testing is automated today? Choose one.

- a) Manual
- b) Manual with some automation
- c) Half automation and half manual
- d) Automation with some manual
- e) Fully automated
- f) Don't know / unsure

5. Do you believe your software testing program can scale to handle new test requirements in the future?

- a) Yes
- b) No
- c) Not sure

6. In five years, what is your goal for your software testing automation ratio? Choose one.

- a) Manual
- b) Manual with some automation
- c) Half automation and half manual
- d) Automation with some manual
- e) Fully automated
- f) Don't know / unsure

7. Do you believe your current software testing solution...

- a) generates reliable testing analytics? Yes No I don't know
- b) tests coverage across platforms? Yes No I don't know
- c) meets all requirements prior to release? Yes No I don't know
- d) increases QA job satisfaction and productivity? Yes No I don't know

8. Which of the following benefits from automation would be the most valuable for you? Choose three.

- a) Freeing up staff's time and resources
- b) Enhanced security
- c) Software with fewer defects
- d) Reduced time to releases
- e) Archival documents and traceability
- f) Repeatability

9. Which features do you find most important in a test automation tool? Choose three.

- a) Ability to do all types of testing needed (load, performance, usability, interoperability, and so on.)
- b) Noninvasive / not accessing the code
- c) Cross-platform testing
- d) Ease of deploying solution
- e) Customer support
- f) Reports
- g) Ease of maintenance

10. If you are already using a test automation tool, are you seeing positive ROI?

- a) Yes
- b) No
- c) N/A



Keysight enables innovators to push the boundaries of engineering by quickly solving design, emulation, and test challenges to create the best product experiences. Start your innovation journey at www.keysight.com.