

RESEARCH

# Mobile Test Automation Trends



# Agenda

- Introduction
- Experts we asked
- Mobile is part of everything
- Test automation tools are fundamental to cope with a dynamic marketplace
- Ask the experts: mobile test automation solutions
- Mobile Automation: the first step is not the only difficulty
- Summary
- Contact Information
- Copyright



## Introduction

The shift of different industries to mobile makes the mobile segment one of the most promising consumer IT fields. According to a research by the app intelligence company Sensor Tower, global consumer spending in mobile apps has reached a record **\$111 billion in 2020** and is expected to amount to **\$270 billion by 2025**.

Being embedded in mobile solutions, new technologies pose challenges in both software development and testing.

At the same time, a dynamic marketplace requires the delivery of high-quality solutions in the shortest possible time. Such a pressure makes organizations provide a high-quality code with speed and agility. Respectively, shortening of the release cycle reduces testing lifecycle. To deal with the pressure, organizations are adopting a test automation strategy for mobile testing.

To get the overview of the current state of mobile automation market and to identify its prospects, we have interviewed the experts specializing in test automation and mobile automation.



## Experts we asked



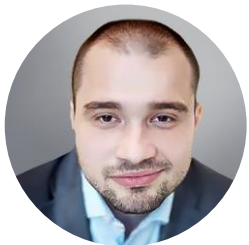
**Antony Edwards**  
COO at EggPlant

**Eggplant** provides digital automation intelligence solutions that enhance the quality and performance of the digital experience. Eggplant enables organizations to test, monitor, analyze, and report on the quality and responsiveness of software applications across different interfaces, platforms, and devices, including mobile, IoT, desktop, and mainframe.



**Matt Robson**  
Executive Director at TSG

**TSG** provides the services of QA (Quality Assurance), delivery assurance, solution assurance, and testing services. The company is located in London, United Kingdom. TSG is the consultancy for Business Assurance and Testing of IT systems. The service packages include also Escrow services, office relocation services and system upgrades, and GDPR services.



**Costin Secareanu**  
Senior QA Automation Consultant at IOVIO

**OVIO** has global delivery centers providing full stack development services: Big Data expertise & Insights, Agile & DevOps delivery models, Test Centres of Excellence. The company also provides consulting services on Quality Assurance, application development and maintenance, business intelligence, business process testing, and performance validation & optimization.



**Marcel Diepenbroek**  
Director at InnSpire

**InnSpire** focuses on innovation, inspiration, and test automation. The company is located in the Netherlands. InnSpire provides the services of security and penetration testing, load and stress testing, usability and crowd testing. The company verifies mobile devices and applications. InnSpire performs test process management and performance analytics and modeling.



**Ron Werner**  
Team Lead Mobile Testing at QualityMinds

**QualityMinds** provides the services of quality assurance and testing. The company is located Germany. QualityMinds provides consulting services spanning from the concept level to operational support. The company performs mobile testing, Agile testing ,requirements engineering, and quality learning. QualityMinds strives to provide a high quality in IT projects.



**Duncan Briggshaw**  
Co-Founder and Technical Director at Odin

**Odin** is the company that design and develop solutions for test automation for more than 10 years. Odin has customers from the US, Europe, India, Africa, and Australia. The company developed the Axe platform designed for development and integration of test scenarios. It generates the test automation code for the majority of automation tools including open-source and commercial ones.



# Mobile is part of everything

Digital transformation and growing dependency on mobile devices trigger the development of the mobile application market.



*Mobile is pervasive across all industries—from boutique app development to large traditional industries—the apps development acts as an endpoint to existing application landscapes*

says **Duncan Briginshaw**, Co-Founder and Technical Director at Odin Technology Ltd.

**Ron Werner**, Team Lead at QualityMinds, also mentions that B2C sales are driven not only in industries like e-Commerce and Travel but also Leisure and Convenience. He also observes a rise of mobile applications in more traditional sectors, e.g., Banks & Insurances.

**Costin Secareanu**, a Senior Consultant at IOVIO, says that the current state of mobile software development market is changing greatly because of the influence of AR (Augmented Reality), wearable apps, IoT (Internet of Things), and Artificial Intelligence (AI), which are making an impact across all of the software development landscape.



*Artificial Intelligence will be further incorporated into mobile app development, providing personalised services, similar to Google Assistant, that have advanced to the point where it's possible for Google to automate the process of calling a restaurant and making a reservation for you. Interesting times*

shares **Costin Secareanu**.



According to Statista, **3.8 billion** people (more than **48% of the world's population**) own a smartphone in 2021. By 2023, this number is projected to increase to **4.3 billion** people. In 2022, smartphone shipments worldwide are expected to add up to more than **1.57 billion** units.



Globally, the Market for Mobile App Development is expected to grow at the rate of **19.5% from 2020 to 2025**, according to Sensor Tower.

The increasing use of mobile devices, adoption of advanced technologies, and implementation of software applications in mobile computing trigger the growth of the **mobile augmented reality**.



*The next big things in my eyes are: Augmented Reality (Google Maps as seen at Google I/O for Android Pie using AR looks amazing), VPS (the Visual Positioning System advocated by Android), ML Kit/Create ML—so it's machine learning for everyone on Android and iOS devices*

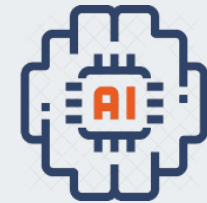
shares **Ron Werner**, Team Lead Mobile Testing at QualityMinds.

Besides, increasing popularity of **cloud computing** has also influenced the mobile industry. **Matt Robson**, Executive Director at TSG, notes,



*The penetration of cloud-based services into the mobile environment will continue with the ongoing expansion of network connectivity capabilities towards ultimately an anywhere—anytime state. This, aligned with the industry direction to centralize both data repositories and application provision in cloud environments will, as a consequence, enable more lightweight and cheaper devices (desktops, laptops, tablets, phones) to be deployed*

Basing on the mentioned above trends of mobile development, **Ron Werner** from QualityMinds says that in summary, we will get even more „Smart“ in Smartphones for the buck.



The global AI market is expected to reach **\$554.3 billion by 2024**, according to data from the Worldwide Semiannual Artificial Intelligence Tracker by the International Data Corporation (IDC).



The global mobile augmented reality market is expected to amount to more than **\$21 billion by 2024**, according to Statista.

But at the same time,



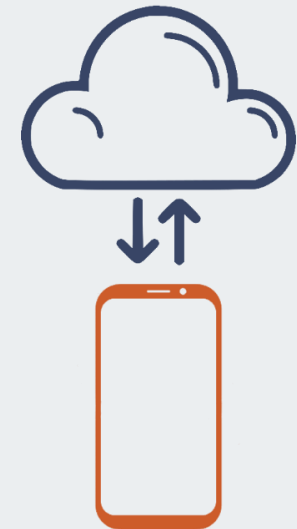
*Mobile apps are almost always a part of a wider set of software components that deliver user experience. There will definitely also be a server, probably a web-based presentation, maybe an Alexa skill, maybe a desktop app, etc.*

says **Antony Edwards**, COO at EggPlant.

**Matt Robson**, Executive Director at TSG, notes that as the pace of market device growth slows and matures, this will invariably lead to a rationalization in the market, which will drive similar rationalization into the test automation space. He also mentions that continued push for faster delivery—continuous delivery and continuous testing—will also drive to full-capability single test tool sets enabling application delivery across all target platforms.

The whole topic of Digital Wellbeing is another truly sensational trend which helps us to relearn healthy phone usage.

Besides, the rising trend of digital transformation all over the world is expected to power the development of the test automation market.



As per Statista, the global cloud applications market is predicted to reach **\$166.8 billion** by 2024.

## Test automation tools are fundamental to cope with a dynamic marketplace

The software test automation market offers tools and technologies that together enable a fast product delivery. It includes solutions for performing static code analysis, functional testing, and load and performance testing using automated test scripts.

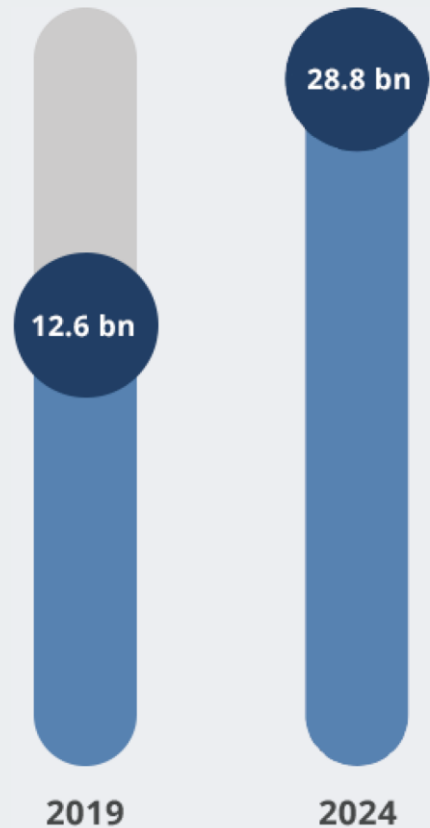
In terms of mobile automation, **Ron Werner** from QualityMinds emphasizes that the instant reward in automation is the possibility to reuse big chunks of test automation code for both iOS and Android.

**When it comes to solutions for mobile test automation, the following tools are available in the market:**



*and others*

Our experts have shared with us their thoughts about test automation solutions currently available in the market and their own experience of usage of these tools and frameworks.



As per a report by MarketsandMarkets research company, the global test automation market will likely expand at an annual growth rate of **18%** from 2019 to 2024 to become worth **\$28.8 billion by 2024** from **\$12.6 billion in 2019**.



## Ask the experts: mobile test automation solutions



Ron Werner



Appium is the de facto programming language independent standard for cross-platform UI testing.

I observe Calabash still being used in existing large test automation setups and supported by cloud testing services like AWS Device Farm, Bitbar, or Perfecto.

For both categories, open source and vendor based, support is community based. There are yet commercial frameworks that offer multi-platform test tools (iOS, Android, Web & Desktop) which are useful in cases where you have multiple clients. There's Ranorex, TestComplete, or Telerik, to name a few.

The middle integration layer of our automation pyramid is API testing. The most widespread automation tools are Postman, RestAssured, SoapUI, Fiddler, Charles Proxy, and even jMeter (mainly a Load & Performance testing tool) finds a lot of use. The base of the bespoke test automation pyramid are unit tests. Here for sure there's the XCode unit testing framework for iOS, as well as Robolectric or junit for Android



## Ask the experts: mobile test automation solutions



Costin Secareanu



Native app development is provided by the vendor which also offers their own in-house automation tools: XCUITest for iOS, Espresso for Android.

Third party vendors as Xamarin exist to do cross platform development (both iOS and Android at the same time), which has its own neat test automation tool: Calabash.

Web apps fit for mobile needs and are the most widely used because of their simple development (i.e. web page) that can be automated with Appium, Perfecto Mobile, Robotium Framework.

Hybrid apps bring the best parts of native and web to the mobile world. They take less to build than a native app but longer than your average web app. They can also be tested with Perfecto or Appium.

For Performance Automated testing you're always gonna be in the trusty hands of Jmeter or Neoload, depending on the project's needs.



## Ask the experts: mobile test automation solutions



Duncan Briggshaw

odin



Consolidation on Appium as a core automation platform has happened quicker than it did with Selenium. Most vendors of functional automation tools for Mobile will wrap Appium in some way, for example UFT Mobile, Experitest, Scriptworks



Besides the automation solution, our experts emphasize on the fact that the effectiveness of mobile test automation depends on a number of factors including software specifics, available time frames and resources, etc.

## Mobile Automation: factors to consider

As per **Ron Werner**, Team Lead in QualityMinds, it's a good practice to consider what kind of automation makes sense and adds real value. He outlines three attributes of automated tests: fast feedback, robust tests, and low maintenance.

**Matt Robson**, Executive Director in TSG, brings up the following **questions**:

- Will the test automation tool be able to successfully deliver the desired test automation pack(s)?
- Does it fit with other application delivery channels?
- Is the mobile development environment disciplined? i.e. Are changes to application and platform managed with test automation updates automatically factored-in?
- Will there be a ROI (Return on Investment)?
- Will subsequent usage payback the investment?



To cope with the challenge of proper implementation of automation strategy, one of our experts, Ron Werner from QualityMinds, shares his own approach to mobile automation and provides the instruction to follow.



First and foremost, consider the testability of the application or mobile website.

**Answer the following questions:**

- Does the app use accessibility ids to identify elements?
- Do web elements have unique ids that make your locators easily identifiable?
- Can repetitive tasks be shortened, e.g., can you get (development build) shortcuts to access logs in user's session, or can you apply deep links to directly jump to certain states in a workflow or parts of the app without having to go on a journey?

Second, ask yourself what can be automated on lower test levels (unit, integration, and API tests) before going on the UI automation route. Quite often the amount of actually needed

can be reduced drastically.

Next, get a clear picture of your users' devices. Use analytics tools like Crashlytics, Mixpanel, Appsee, etc. to get to know your user base and their problems, and the exact devices that need test coverage. Target your top 20 devices for Android and iOS.

And finally, check if extensive UI automation is needed at all – one of our customers, a loyalty program provider with a very popular app (> 5 million installs), has implemented a smoke test suite with less than 20 automated UI tests. Instead, they rely on the human factor, and I happen to know a few mobile exploratory testers who are bug magnets. They will find your quality hotspots very fast on a range of different OS/device combinations. Not that much automation needed!

UI E2E test scenarios – which traditionally tend to be more brittle –

**Ron Werner**, Team Lead at QualityMinds

But even being applied to a proper project at the appropriate time, mobile automation still remains challenging process because of the dynamics of mobile automation market and limited capacities of ready mobile automation solutions available now.



## Mobile Automation: the first step is not the only difficulty

One of the biggest challenges of the mobile test automation industry is the multitude of devices and the fragmentation of operating systems. And when it comes to automated scripts, the principle “write once, run anywhere” does not work for now.

**Ron Werner** from QualityMinds says:



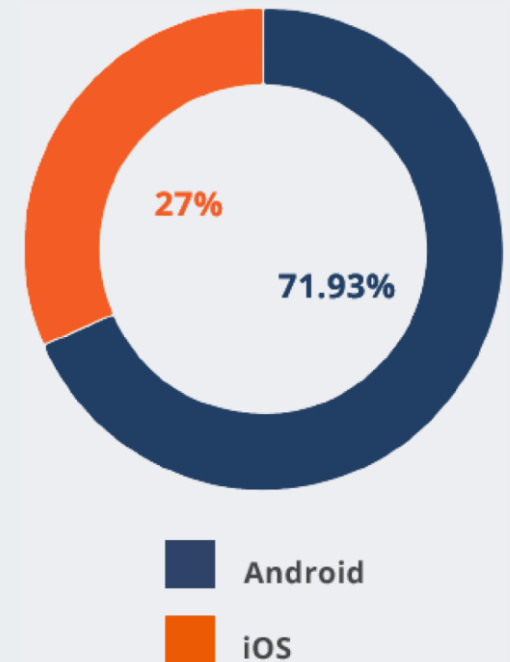
*The situation used to be much worse in the Android ecosystem, but in my experience, ever since Android 6, the OS has been acting quite stable. Addressing the camera especially on Sony and Huawei devices might not work as expected, not as smoothly as with Google devices like Pixel and Nexus. You still have to brace for crashes!*

Beside that, the diversity of mobile device manufacturers and their constant market struggle overfill market with smartphones and tables of different models and capacities. As a result, mobile testing requires a number of physical devices. **Marcel Diepenbroek** from InnSpire also mentions that if tested internally, management of physical devices is time-consuming and cumbersome (adapters, on/off, remote connections, batteries, upgrades/updates).



*Outdated before execution: typically the newest and the oldest devices will cause issues. And need to be tested. Keeping up to date with newest devices is time consuming – and expensive if tests are performed internally*

says **Marcel Diepenbroek**.



Android maintains its status of the leading OS for smartphones worldwide. In 2021, its global share is **71.93%**.

The main Android’s rival in the market is iOS. It is the second most popular mobile operating system in the world with the global market share of more than **27%** in 2021.

However, **Ron Werner** from QualityMinds draws attention to the situation that there always is the wait for updates to the test framework when new OS versions are getting released.



*Remember the move from UIAutomation to XCUI on iOS11? Appium also needed weeks to upgrade, but the Appium community is reacting fast and has gained a lot of momentum – kudos over here from my side!*

says **Ron Werner**.

**Duncan Briginshaw**, Co-Founder and Technical Director at Odin Technology Ltd., emphasizes that devices and OS versions are so diverse that compatibility testing is troublesome, and supposes that Cloud Device farms, e.g., Bitbar, will grow in adoption.



*It is an ever changing landscape with teams, vendors, and OS's projects playing catch-up with Apple and Google*

says **Duncan**.

Even the usage of emulators cannot ensure a proper mobile testing. **Ron Werner** from QualityMinds mentions that real user situations like changing or flaky net coverage (WiFi & weak mobile networks) are hard to simulate. Yet in here, there's plenty of room for synching and package loss errors. He also shares that gestures are hard to automate in a natural, human-like way – no user swipes in a straight line from A to B.





**Besides, Ron singles out the following challenges of mobile test automation:**

- access to different user profiles on Android
- high investments for cloud testing services
- building up own device labs
- testing cameras (for QR codes etc.)
- automation of apps that run in MDM environments like MobileIron.

So, as per **Ron Werner's** point of view, on the one hand, as new technologies are introduced (ARKit, ARCore, ML Kit et al.), companies need tools for testing them. So far, native test support is non-existent, but this is a traditional initial nuisance testers have to face. As with Selenium and Appium for web and mobile, independent tools will arise, once native testability is improving and is getting introduced into the frameworks.



*On the other hand, new programming languages are also applied in test automation (examples: Kotlin for Espresso, Swift for XCUICore). CI/CD pipelines also have integrated automation tasks & distribution via HockeyApp, Fabric and so on, making it less painful for all stakeholders to get and test the latest builds. There is still a big need for test automation frameworks for different Smartwatches, Voice Assistants, and other mobile embedded systems (Smart TVs, Cars, Smart Home).*

shares **Ron**.

**Matt Robson**, Executive Director at TSG, is sure that all the challenges of mobile automation form a significant driver for organizations to introduce test automation, to provide continuing escalation of test cost. Test Automation solutions have to focus on 'build once, execute many' principle, with particular consideration on how to correctly handle the expected results.

Even still trying to cope with the mentioned above challenges, the ready mobile automation solutions can ensure fast and continuous product delivery overcoming the challenges. And our experts share their own experience.



## Some solutions to automation challenges

**Costin Secareanu**, Senior QA Automation Consultant at IOVIO, says that the multitude of devices and the OS fragmentation can be successfully solved by having access to a Mobile Test Lab Center which provides ample options of devices and OS's.



*Network carrier testing difficulties were also met with success through the use of a Mobile Lab Center which comes equipped with Real Devices that have access to Mobile Networks.*

adds **Costin**



*An example case would be that we cannot test the application on an older model. Let's say, an older Iphone which we didn't have in our QA inventory: this was quite an issue back in the days and led to issues that were otherwise preventable.*

**Ron Werner** from QualityMinds says that when it comes to automation of gestures, they also can be automated to some extent (e.g., swipe, scroll, pinch, multi-finger taps, drags). But in this case, gestures are viewport dependent.



*You begin and end a drag operation on different x/y coordinates for screen sizes, resolutions, and pixel densities. And it's difficult to effectively automate multi touch actions and 3D touch. XCUI, Espresso, Appium & Calabash support them, to name a few.*

notes **Ron Werner**.

In case of responsive websites on mobile browsers, they can also be automated using open source frameworks like Galen, or commercial ones like Applitools Eyes. Ron also adds that it's still hard to access embedded (Google) Maps – as can be seen in the DriveNow or Uber apps.



*In this case, you're better off working closely together with your friendly devs to be able to retrieve coordinates via API here rather than going via UI.*

says **Ron Werner**.

Basing on Ron's point of view, AI driven tools, ML aided testing, cloud based tools and services, self-healing tests, more visual testing, own distributed mobile device labs for testing using OpenSTF, and delivery & distribution pipelines that help building, signing and testing are still required.





## Summary

The increasing requirements to software quality and reduction of delivery cycle initiate the growth of test automation market. At the same time, shift to mobile triggers the development of solutions for mobile automation. The tools and frameworks available in the market can cover wide functionality of available mobile solutions reducing testing cycle. But, the constant development of new mobile technologies is challenging mobile test automation. This factor drives the need for more investment in development of solutions for mobile test automation in order to enable companies to choose the tool addressing their unique needs.

## Contact Information



**E-mail:** [contact@qa-testlab.com](mailto:contact@qa-testlab.com)



**Headquarters:** Falirou 34, 1st floor,  
office 115, Strovolos, 2066, Nicosia, Cyprus



**Facebook:** [QATestLab](#)



**LinkedIn:** [QATestLab](#)



**Website:** [qatestlab.com](http://qatestlab.com)



**SkypeID:** sales.qatestlab