# TURKEY **SOFTWARE QUALITY** REPORT

# 2020-2021

ROBOTIC PROCESS AUTOMATION (RPA) IN TESTING AND TEST AUTOMATION







## CONTENT

Foreword	3
Executive Summary	5
Survey Questions and Analysis	7
Contributors	29
About	30
Turkish Testing Board	31



MALAH



## FOREWORD

As Turkish Testing Board, we are pleased to bring you the 2020-2021 edition of the Turkey Software Quality Report [TSQR] which focuses on "Robotic Process Automation[RPA]". By coincidence, this theme was selected by the TestIstanbul Strategy Commiteee months before the Coronavirus outbreak. The outbreak again proves the importance and the necessity of automating repetitive, human intensive processes thus RPA implementations. In this report, you will find the trends, tips and obstacles regarding this very hot topic.

The report is also designed to help organizations and especially decision makers to make paradigm shifts in their mindsets. It not only draws a clear picture of the current situation in the Turkish software testing industry, but also sets the de-facto standards and trends for future information technology (IT) projects. We hope this report will be reference point for all decision makers.

With the help of TSQR, we are trying to lay down the foundations of a healthy discussion platform for improvement in Turkish software testing market. As a conventional practice, TSQR will be presented at the opening ceremony speech of TestIstanbul 2020 (testistanbul.org), which will be held both virtual and offline this year, initiating a series of keynotes, presentations and discussions.

Regards,

TestIstanbul Strategy Committee



## **EXECUTIVE SUMMARY**

We are living in unprecedented times. Due to the Coronavirus outbreak, our daily habits, behaviors including our working habits are changing dramatically. the outbreak has brought us a brand new concept called "Low touch economy". Low touch economy not only affects and changes our human relationships but also the working dynamics of many businesses.

The COVID-19 pandemic provides a unique opportunity to bring automation to the front line of many businesses making a profound positive effect on an already growing market, Robotic Process Automation (RPA) market. According to the research reports released before the pandemic, Gartner has predicted spending on RPA software to hit \$1.3 billion in 2020 and Forrester has predicted the RPA software market to total \$2.9 billion in 2021. Clearly, interest in RPA has been high for a while especially where manual repetitive processes are being performed by human resources but with the help of pandemic it is now accelerating very fast. According to Turkey Software Quality Report, the main barriers in front of this acceleration in Turkish IT market are businesses' fear of losing control with the implementation of RPA projects and the lack of dedicated RPA teams such as RPA studios, RPA chapters, and RPA interest groups inside the organizations.

The other but relatively slower trends compared to the RPA penetration are adoption of Test-driven development (TDD) practices and the adoption of test automation pyramid. Although there are many factors preventing these trends from entering the mainstream, the lack of quality culture among company employees seems to be the toughest and the most difficult one to overcome.

In the report, effects of Agile adoption in the market are also very obvious. Companies are turning towards simpler, leaner methods of software development and software testing. The simple methods of information recording such as checklists and mind maps have started to replace the more traditional ones such as test cases, test plans, etc. Being Agile requires not only adopting new management practices but also adopting new technical practices such as unit testing, continuous testing, continuous integration and continuous delivery. These technical practices are also on the rise with the help of Agile frameworks.

Finally, there is a growing emphasis on the non-functional aspects of software and software development, reliability is one of them. According to survey results, survey respondents rely mostly on their testing environments in their companies. Following the testing environment, the development environment is perceived as a reliable environment. In order to better adopt continuous delivery and continuous deployment practices into the software development lifecycles, companies should invest in their staging environments whether they call it UAT, staging and/or preprod.



## QUESTIONS

1	WHAT ARE YOUR TOP RISKS AND/OR CHALLENGES WHILE IMPLEMENTING ROBOTIC PROCESS AUTOMATION (RPA) ADOPTION?
2	WHAT KIND OF DOCUMENT/INFORMATION IS COLLECTED AS EVIDENCE FOR THE PROOF OF TESTING IN YOUR ORGANIZATION?
3	WHAT IS THE USAGE OF TEST-DRIVEN DEVELOPMENT(TDD) PRACTICE IN YOUR ORGANIZATION'S OVERALL DEVELOPMENT EFFORTS?
4	WHAT PERCENTAGE OF YOUR DEVELOPMENT EFFORTS ARE ALLOCATED TO UNIT TESTS?
5	WHAT ARE YOUR TOP RISKS AND/OR CHALLENGES WHILE APPLYING CONTINUOUS TESTING PRACTICES?
6	IN YOUR ORGANIZATION, WHO IS LEADING RPA EXPLORATION?
7	IF YOUR ORGANIZATION IS CURRENTLY UTILISING RPA OR HAVING PLANS FOR UTILISING IN THE FUTURE, IN WHICH FIELDS WILL IT BE APPLIED?
8	PLEASE RANK THE BELOW TESTS BASED ON THE ALLOCATION OF TESTING EFFORT OF YOUR ORGANIZATION.
9	WHICH OF THE FOLLOWING DEPLOYMENT ENVIRONMENT(S) IS/ARE RELIABLY AVAILABLE IN YOUR ORGANIZATION?
10	IN AVERAGE, HOW LONG DOES IT TAKE TO GO LIVE A NEW CODE COMMIT FROM REPOSITORY TO PRODUCTION?

### WHAT ARE YOUR TOP RISKS AND/OR CHALLENGES WHILE IMPLEMENTING **ROBOTIC PROCESS AUTOMATION** (RPA) ADOPTION?

\* multiple selection was allowed



None

Robotic process automation (RPA) is a form of business process automation technology based on metaphorical software robots (bots) or artificial intelligence (AI) workers. It is obvious that RPA can be a very useful tool in a strategic transformation initiative. Business leaders have high hopes for huge returns from RPA implementations and even though it is a very new technology, the survey shows that almost 60% of the organizations have started to implement RPA.

RPA technology has a totally different technical design approach compared to well known traditional approaches. In addition to that, this new trend has caught IT teams up short due to the sudden and growing demand of business units. IT teams' lack of technical skills and know-how have created a technical burden on these teams. This may be one of the main reasons why most of the survey respondents addressed technical complexity as the main risk while implementing RPA projects.

"Operational Risk" and "Business Process Stability" risks have almost the same rankings according to the survey results. Actually, these two risks have a strong relationship with each other. In successful RPA projects a clearly defined process is automated. Since most enterprises do not have clearly defined, stable processes, they start automating for the sake of automation and end up either automating a wrong process or getting lost while trying to reverse engineer an unstable, complex process. Lack of business process stability creates operational risks at the end. According to the respondents, these risks are followed by the risk of "Team Capacity". Lack of planning, underestimated business process complexity, and unexpected maintenance efforts have created a huge burden on RPA teams causing them to experience capacity problems.

As for the "Ownership" Risk, this risk will arise if the company's overall perception of RPA and its importance is low among stakeholders.

#### FUTURE PREDICTIONS

Gartner predicts spending on RPA software to hit \$1.3 billion in 2020. Forrester has predicted the RPA software market to reach a total of \$2.9 billion in 2021. Clearly RPA interest has been high for a while especially where manual repetitive processes are still being performed by human resources. Survey results also show this fact clearly where more than 50% of the organizations are implementing RPA solutions. We are also expecting an increase in RPA adoptions in the near future.

With the help of lessons learned from current projects, companies will be better aware of the risks and impacts regarding RPA implementations. Otherwise, RPA technology may share the same fate with the previously tried and abandoned automation approaches. As a conclusion, companies investing in RPA should also consider investing to manage the risks associated with RPA implementations.

## WHAT KIND OF DOCUMENT/INFORMATION IS COLLECTED AS EVIDENCE FOR THE **PROOF OF TESTING** IN YOUR ORGANIZATION?

		* multiple selection was allowed
<b>77</b> % Bugs / Bug Reports	75% Test Cases	<b>59</b> % Test Plans
47% Logs	<b>42</b> % Test Progress Reports	<b>39</b> % Test Analysis Documents
<b>32</b> % User Stories	<b>31</b> % Test Designs	
29% Sprint Backlog Items	23% Incidents	
20% Tasks / To-Do Lists		



Testers are using different types of documentation during their testing phases such as bugs/bug reports, test cases, screenshots, etc. In this way, they create a test documentation repository to keep the information they found. This repository is a kind of testing memory of the organization.

In Agile development, organizations have started to lessen the documentation burden as much as they can by utilizing test design techniques such as exploratory testing. However, this does not mean there is no documentation. In Agile projects, exploratory testing is done solely or in addition to scripted testing. Even though Exploratory testing is done solely, testers still create some documentation by forming test charters before the exploratory test sessions and by taking notes during these sessions which constitutes the valuable information they found about the system under test.

As for scripted testing, they design test cases first and later proceed with the test execution. Generally, the test teams store these test designs and test cases in test management or test documentation tools. Besides these ways of documentation, some organizations are using checklists, mind maps, etc.

Another crucial documentation type is the bugs found and generally, testing teams are logging and tracking them with issue tracking tools such as JIRA. Rather than test designs and bug reports, testers are also preparing documentation for test plans, test strategies, test status reports, test improvement backlogs items, test sprint backlogs items, etc. Documentation in testing is a very critical part of SDLC, and organizations are using different approaches to create and use them whether it is light weight or heavy weight.

#### FUTURE PREDICTIONS

As organizations get used to the Agile way of working more and more, the documentation burden will gradually decrease. The simple methods of information recording such as checklists and mind maps are expected to replace the more traditional ones such as test cases, test plans etc. Furthermore, the bug reports will be a type of documentation that will continue to be used by the testing teams in the future. Apart from these, sprint backlog items, test plans, test status reports, test strategies, and test logs will be used by the teams widely. According to the survey results, the organizations are conducting similar ways of working for documentation. All of these document types are an essential reference for the teams when they require information and proof of test scenarios, bugs, user stories, the definition of done lists, business know-how, backlog items, test plans and test strategies.

## WHAT IS THE USAGE LEVEL OF **TEST-DRIVEN DEVELOPMENT (TDD)** PRACTICE IN YOUR ORGANIZATION'S OVERALL DEVELOPMENT EFFORTS?



31%-40%

7%

TDD is a major change in the coding habits of developers and is not mandatory in all organizations. For these reasons, the majority of the organizations who have replied to the survey question indicated that they are not utilizing TDD practice well. Majority of the organizations seem to be in the early stages of TDD implementation. Another reason for these results is surely the difficulties experienced while implementing TDD and changing coding habits.

#### FUTURE PREDICTIONS

The importance of shift-left testing is becoming more obvious day by day. However, shift-left testing may only become a de-facto standard if it is supported by the upper management and taken into consideration as a business rule rather than just a proof of concept. Another factor that will support the importance of shift-left testing will be the approach of the big companies which dominate the IT industry. If these companies continue their current positive stance on these kinds of technical practices and support them, then the usage level of TDD will increase. Otherwise, we may see a similar trend in the next few years.

## WHAT PERCENTAGE OF YOUR DEVELOPMENT EFFORTS ARE ALLOCATED TO **THE UNIT TESTS?**



Survey results reveal that although the time allocated to unit tests has increased compared to previous years, the desired penetration rates are still not reached. Particularly, the 18% of respondents stated that they allocated more than 50% of their development efforts to unit tests which is a very positive sign. But, when compared to the worldwide unit test penetration statistics, Turkish market average is still behind the worldwide average.

#### FUTURE PREDICTIONS

Software development without utilizing unit tests is like making trapeze show without using a safety net. In the absence of a safety net, as a trapeze artist, you would be afraid of taking steps and could not move. Unit tests written during development keep you safe and on the track. In this way, you can make your changes even with your eyes closed. The more unit tests you write at the beginning of the project, the faster you will respond to the future change requests.

In the near future, we are expecting development teams to spend more time and effort on unit testing. This investment will pay back in the short term by both reducing the number of bugs introduced and increasing the maintainability of their software.

## S WHAT ARE YOUR TOP RISKS AND/ OR CHALLENGES WHILE APPLYING CONTINUOUS TESTING PRACTICES?



According to the survey results, there is a clear lack of knowledge regarding Continuous Testing practices and processes. Research indicates that even people who are aware of the necessity of the practice have some problems during the implementation. The good news is, this side of the problem can easily be solved by professional training and consultancy.

Moreover, the state of organizational culture is another impediment. Nearly one third of the participants' answers indicate the lack of quality culture which causes not enough commitment. Undoubtedly, this is the toughest one, making people believe in the quality culture. Change in this manner might take some time, but it is fundamentally important. We should never forget "No change can happen without consent of the people who participate in".

Technical and tool problems come last as always and expected. Even though there are many tools in the market for a long time, none of them is good enough to solve all the technical issues while implementing continuous testing practices.

#### FUTURE PREDICTIONS

In the last few years, we observe that organizations heavily invest in engineering practices for their agile transformations compared to the previous years. Professionals have understood that this change is double sided, engineering and management. So, they have started to train themselves, attend conferences and hire subject matter experts.

In the near future, we expect this trend and investment to be continued. Companies that ignore this trend will have to join the race or quit. Because there is no other way of software delivery in a reasonably short time without investing in continuous testing practices.

In the long term, we expect continuous testing to be embedded into all software development life cycles of companies which will survive in the race.

# IN YOUR ORGANIZATION, WHO IS LEADING **RPA EXPLORATION?**

\* multiple selection was allowed



Other

According to the survey results we can see that most of the organizations are not exploring RPA opportunities yet. In most organizations where RPA is explored, RPA is led by Information Technology (IT). IT departments are followed by multiple functions and centralized RPA teams. So these results show that RPA is not explored in almost half of the organizations. In organizations where RPA is explored, more than half of them is led by IT.

#### **FUTURE PREDICTIONS**

Despite the fact that almost half of the organizations are not exploring RPA opportunities, we expect a growth in the number of organizations exploring RPA opportunities. This will result in an increase of RPA awareness and organizations will have dedicated teams who will lead RPA exploration. Although IT departments and teams having multiple functions constitute the highest percentage of the leadership status at the moment, we are expecting a decrease in these kinds of teams and expecting a growth in dedicated RPA teams.

## IF YOUR ORGANIZATION IS CURRENTLY UTILIZING **RPA** OR HAVING PLANS FOR UTILIZING **RPA** IN THE FUTURE IN WHICH FIELDS WILL IT BE APPLIED?

\* multiple selection was allowed



Although RPA does not have a long history in Turkish IT market, companies' investment of time, budget and effort are all promising signs of a bright future for RPA projects. According to the survey results, IT department is the top rated department among other departments which invest in RPA projects. This result may be due to the fact that RPA is still perceived as an IT tool investment rather than a process improvement investment. The other factors behind this result are the lack of awareness among business functions regarding the benefits of RPA and their reluctance to implement RPA projects due to their fear of losing control with the implementation of RPA projects.

#### FUTURE PREDICTIONS

Like many other trends, the future of RPA will be shaped based on the needs of the customers. We can explore RPA's future from the perspectives of people, process, and technology as follows:

People: Test automation engineers are the best candidates who can take part in RPA implementation projects. They can be supported by developers. But both candidates should reconsider their development approaches according to the needs of the RPA projects.

Process: With the increasing competition in the IT industry, the adoption of Agile frameworks, and the increasing pressure on time to market, the importance of Minimum Viable Product (MVP) becomes even much more obvious. RPAs will help companies achieve faster processes to deliver their products to the market.

Technology: The emergence of both commercial and open source RPA tools will provide companies more and cheaper tool alternatives to select for their RPA projects.

With the help of these factors, we are expecting to see a growing number of RPA projects. In addition to that, we are expecting finance, HR, and accounting functions to surpass the IT and operations functions and take the lead in RPA implementations.

## PLEASE RANK THE BELOW TESTS BASED ON THE ALLOCATION OF TESTING EFFORT IN YOUR ORGANIZATION.

(5- HIGHEST TESTING EFFORT IS ALLOCATED, 1- LOWEST TESTING EFFORT IS ALLOCATED)



Compared to last year's survey results, although there is a slight improvement towards automated integration tests and automated unit tests, the results still show a clear Ice-cream Cone Anti-Pattern. This finding illustrates either a lack of expertise or willingness in unit and integration test automation among development teams. The rising popularity of specialized drag-and-drop automated GUI testing tools might be the other factor causing this result.

Unfortunately, the data may also be an indicator of inadequate application of clean code software development practices. Ice-cream Cone Anti-Pattern and its implementation in test automation architecture comes up with great risks in maintainability, stability, and reliability that no organization wants to have.

#### FUTURE PREDICTIONS

As mentioned in the previous survey, in the near future, we might expect that the Ice-cream Cone Anti-Pattern will evolve into the right test automation pyramid, maybe not the ideal one but close to it. This year's results also support this argument.

In addition to that, in the near future, the prospective candidates for IT job openings should be able to present their specialized knowledge in not only topics respective to fulfill the primary demands of the position at hand but also in auxiliary areas like testing and automation to further distinguish themselves. This prediction is assumed to hold ground even in businesses where IT plays more of a support role. Therefore, with the increasing IT infrastructure and process compliance requirements and an ever-increasing necessity to differentiate oneself in the job market, we predict an increase in the technical and automated forms of testing in general.

# WHICH OF THE FOLLOWING **DEPLOYMENT ENVIRONMENT(S)** IS/ARE RELIABLY AVAILABLE IN YOUR ORGANIZATION?

\* multiple selection was allowed



Staging

#### ANALYSIS OF THE CURRENT SITUATION

User Acceptance

Test (UAT)

According to survey results, survey respondents rely mostly on their testing environments in their companies. Following the testing environment, the development environment is thought as a reliable environment. It is most probably due to the fact that most of the tests are conducted in the testing and the development environment. Although staging, UAT, and pre-prod environments are in between testing and production environments, and should be the mirror of the production environment, according to the survey they are lacking maturity. This may cause false-positives and false-negatives resulting in reliability issues while testing.

#### FUTURE PREDICTIONS

In order to adopt continuous delivery and continuous deployment practices better into the software development lifecycles, companies should invest in staging environments whether they call it UAT, staging and/or preprod. These kinds of investments will show their payback in the near future and we are expecting to see reliability increases in these environments.

## ON AVERAGE, HOW LONG DOES IT TAKE TO GO LIVE NEW CODE COMMIT FROM **REPOSITORY** TO **PRODUCTION?**







11% Less Than One Hour





In Agile frameworks, codes are carried to the production environment piece-by-piece in certain short time periods. Therefore, code transfer controls in Agile contain less risk and require less effort and time. 11.8% of the respondents indicate it takes less than one hour and 24.2% of the respondents indicate that it takes less than one day to go live a new code commit from repository to production which are signs of Agile software development efforts.

However, in the traditional waterfall software development model, most code groups are moved to production on the same day and code transfer controls require considerable effort. Today, large code transitions continue to be made collectively in the waterfall software life cycle at a significant number of institutions. Thus, according to the survey results, companies with code transfer time of more than 1 week constitute a significant percentage.

#### **FUTURE PREDICTIONS**

With the widespread implementation of the Agile frameworks, the code transition process to the production environment will be accelerated in most companies. As soon as the software testing is done, the code will be transferred to the production environment piece by piece in the meantime. This will decrease the waiting times and transitions, longer than 1 week will be significantly reduced.



## CONTRIBUTORS



**Abdurrahman Akın** Kuveyt Türk Katılım Bankası



**Cihan Hızlıkan** Anadolu Hayat Emeklilik



Berk Dülger Keytorc



**Gizem Taşçı** Turkish Testing Board



**Bilge Makas** Turkish Testing Board



**Göktürk Erdoğan** BKM



**Onur Başkırt** Emirates Airlines



**Cem Uraltaş** Turkish Testing Board



Koray Yitmen Turkish Testing Board



**Mehmet Peker** Garanti Teknoloji



**Ünzile Algül** Dataprocess



**Miraç Emektar** Virgosol



**Yıldıray Elmacı** Sigorta Bilgi ve Gözetim Merkezi



Serkan Cura Intertech

## ABOUT



Turkish Testing Board (TTB) is the regional body representing and supporting software testing professionals in Turkey. The TTB was constituted in Istanbul in September 2006 as a non-profit organization and a member of the International Software Testing Qualifications Board (ISTQB<sup>®</sup>).

TTB is responsible for certification of testing professionals to the standards and syllabi laid down by the ISTQB. TTB also acts to generate public awareness of the economic and risk mitigation benefits that professional software testing practice offers.

www.turkishtestingboard.org



TestIstanbul is the largest conference in South East Europe and Middle East on software testing. TestIstanbul introduces the region not only to the advancements in software testing but also to the advancements in other streams of SDLC like business analysis, design, development and usability. With its almost 400 participants from all over the world every year, TestIstanbul creates a healthy discussion and networking platform for IT professionals and organizations.

www.**testistanbul**.org



ISTQB<sup>®</sup> is a global, non-profit organization responsible for enabling test professionals, through globally accepted software testing certification standards to support their career development. As of October 2019, ISTQB<sup>®</sup> has administered over 920,000 exams and issued more than 673,000 certifications in over 120 countries world-wide. The scheme relies on a Body of Knowledge (Syllabi and Glossary) and exam rules that are applied consistently all over the world, with exams and supporting material being available in many languages.

www.**istqb**.org

## **TURKISH TESTING BOARD**

Turkish Testing Board has been carrying out the following activities to increase software testing awareness in the information technology sector since 2006:

#### **International Certification**

Turkish Testing Board conducts international ISTQB® certification exams and gives internationally accredited certificates to participants who are successful in the exam. Nearly 4,000 test specialist candidates have applied to the board and entered the certification exams since 2006. Certificate exams organized within the association:

- · ISTQB<sup>®</sup> Certified Tester Foundation Level
- · ISTQB® Certified Tester Foundation Agile Tester Extension
- · ISTQB® Test Manager ISTQB® Certified Tester Advanced Level
- · ISTQB® Test Analyst ISTQB® Certified Tester Advanced Level
- · ISTQB® Technical Test Analyst ISTQB® Certified Tester Advanced Level
- · ISTQB® Test Automation Engineer ISTQB® Certified Tester Advanced Level

#### **International TestIstanbul Conferences**

Turkish Testing Board has been organizing International TestIstanbul Conferences since 2010. In the last ten conferences, 34 keynotes and more than 5,600 participants from 50 countries were hosted. Turkish Testing Board is a non-profit organisation, the profit of TestIstanbul Conferences is donated to scholarships.

#### Panels & Events

The board organizes sector or topic-based panels for the development of the software testing industry. More than 1,000 professionals have attended the events. The panels and events held so far are TestFinance, TestInsurance, TestAnkara, Testİzmir, TestGames, TestFinTech, TestDefence.

#### **Translation Projects**

The translation group within the board works on the translation of ISTQB<sup>®</sup> documents in order to bring international software testing terminology to Turkey. Documents translated so far are as follows:

- · ISTQB® International Certified Foundation Level Software Testers Curriculum 2011
- · ISTQB® International Certified Fundamental Level Software Testers Curriculum 2018
- · ISTQB® Software Testing Glossary
- · ISTQB® International Certified Advanced Level Test Analyst Curriculum.

TURKEY SOFTWARE QUALITY REPORT 2020-2021

TURKEY **SOFTWARE QUALITY** REPORT 2020-2021

turkishtestingboard.org | certification@turkishtestingboard.org Phone: +90 212 276 06 48 | Fax: +90 212 276 06 47





