



Trends in software testing

Business Excellence

July 2016

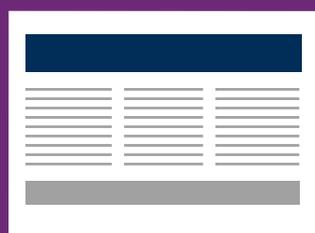
KPMG.com/in



Table of contents

Foreword

3



Key findings

5





Foreword

There is a significant demand from customers, employees and end-users for responsive, user-friendly software applications that help improve areas of communication, business and entertainment. There has also been a surge in the need for a 'zero tolerance' environment, as any failure, error or outage could result in immediate exposure to the global audience via social media channels.

To keep up with the pace of digital transformation initiatives, testing is not just viewed as a sequential phase affecting just the software implementation, but a simultaneous process that goes hand in hand with developmental activities.

Software testing is witnessing a paradigm shift with the testing processes scaling to a higher degree of maturity while ensuring considerable flexibility to accommodate various business needs. The most critical being the pressing demand for speed-to-market and enhanced user experience with the advent of wearable devices. In this event, cloud-

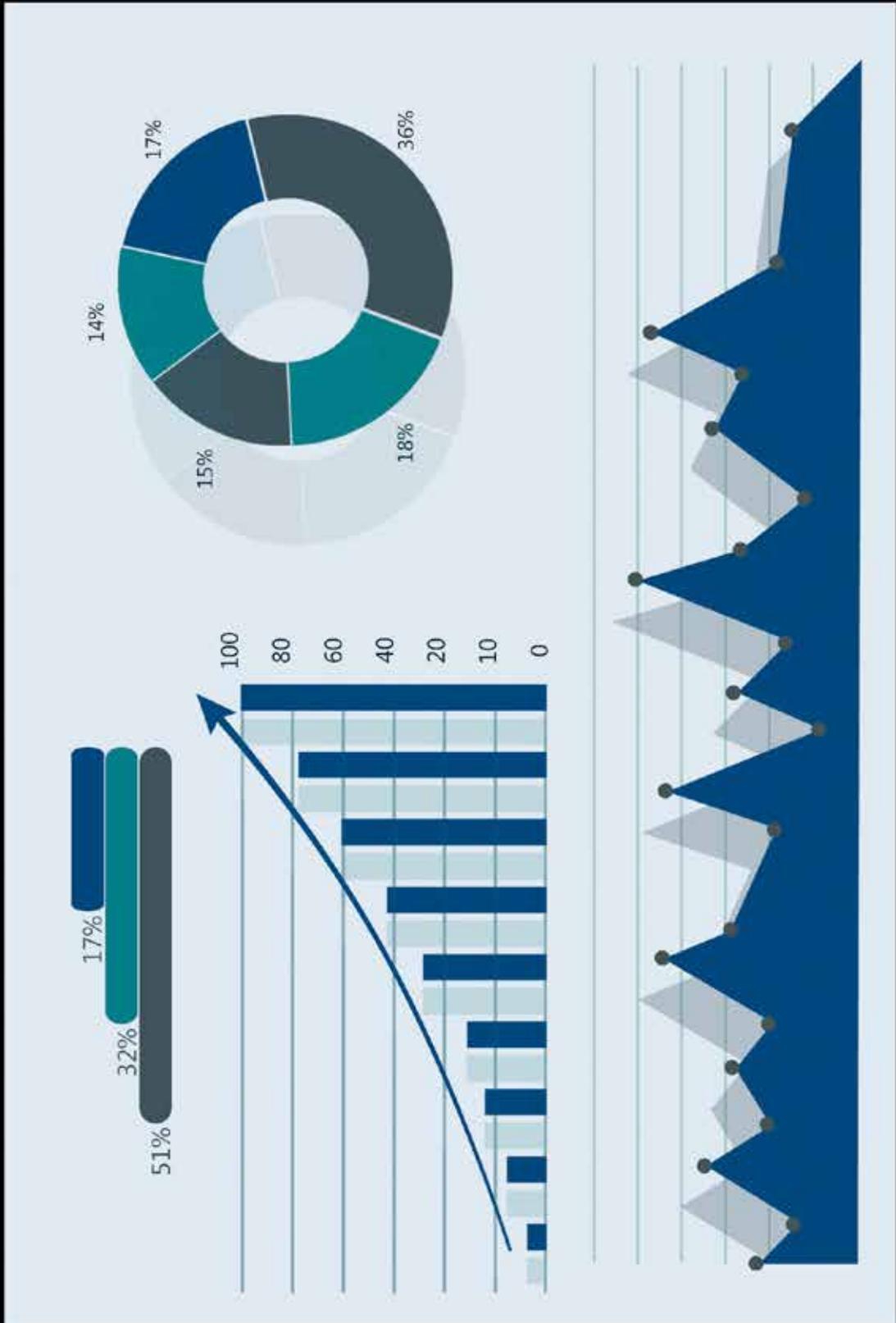
based testing has gained traction significantly, as cloud environments can be set up quickly on a need basis, thus enabling faster and more agile test services by evading test environment bottlenecks.

Moreover, the rapid influx of open source tools in the market has reaffirmed the usage of automation tools in testing. Automation can help improve software quality, corporate compliance and application delivery times.

In lieu of this, KPMG in India has conducted a qualitative survey of senior IT executives from varied firms, predominantly product-based organisations. The survey results revealed a paradigm shift in the software testing market. With digital transformation being a key game changer, there is a growing consensus amongst IT executives that Quality Assurance (QA) and testing hold paramount importance due to the profound impact they have on business outcomes



Prasanth Shanthakumaran
Partner
Business Excellence
KPMG in India



Key findings from our survey



Mobile and cloud testing poised to play a key role in the social, mobile, analytics and cloud (SMAC) era

- Mobile devices have become a part and parcel of everyday life. This might include booking a ride using a mobile application, checking the weather forecast, grocery shopping, fund transactions, and so on. The mobile platform has metamorphosed from just another way to consume content to one that enables users to accomplish much more, every day.
- With digital media consumption on mobile devices skyrocketing, there is a significant increase in mobile testing activity, including those related to the functionality, performance and security of mobile applications and devices. Mobile devices have, thus, become a major part of many organisations' digital development strategy.
- Organisations are focussed on developing effective testing procedures that can achieve test coverage without falling prey to the accelerating development lifecycle. Whilst 40 per cent of the participants affirmed that the mobile market will be the key factor driving QA development, 27 per cent of the participants believe that cloud testing is the sought after niche for software testing services.
- The development lifecycle of mobile applications is relatively compact as compared to a web application. This, along with the multitude of operating systems used on handsets, poses a challenge for software testing teams in terms of timely delivery and having the environment to support testing.
- Cloud infrastructure offers a convenient solution unlike other test environments which can be difficult and expensive to build and maintain. It is also flexible, allowing businesses to scale up or down as part of a dynamic testing strategy.



Process improvement combats challenges in the test execution area



- When larger and more complex systems that play a critical role in the society are being developed, it is imperative to produce low-defect density systems. According to our respondents, most often the testing phase is found to exceed the time allotted for them by 30 per cent especially for large projects owing to requirements volatility and the lack of standardised processes in organisations.
- In addition, there are challenges in terms of short time-to-market requirements, strong competition, new technologies and a wide adoption of outsourcing. In short, improving the testing process is not an option, it is a mandate to thrive and excel in business.
- The survey reveals that the Testing Maturity Model Integration (TMMi) is a model of testing can help organisations determine whether their testing processes are complete and effective. It contains a high level quality assurance framework consisting of interlinked concepts. This framework can be used as a communication vehicle for ideas and concepts inside an organisation that adopts the model, and facilitates it among the members of the broader testing community.
- As a reference model of testing practices, TMMi can facilitate process improvement, assessment and conversation. Increased testing maturity can help improve an organisation's bottom line by enhancing customer satisfaction, increasing development productivity, speeding delivery rates and reducing costs, but only in the context of a holistic quality assurance approach.

Overview



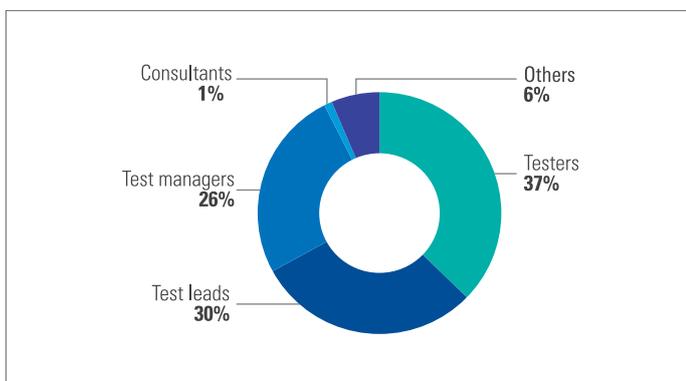
About the survey

KPMG in India, knowledge partner for World Conference Next Generation Testing in 2015, conducted the World Testing Survey in Bangalore from 23–24 July 2015, to understand and study the trends, thoughts and demands across an eclectic group of respondents. This included business-specific industry experts as well as representatives from the realm of testing. The survey reveals realistic facts and figures procured from the participants, which can help organisations adapt their practices in line with the industry specifics.

The results yielded thought provoking insights from the milieu of scenarios the testing industry experienced, with a key focus on the trending paradigms that are parallel to the evolving business needs. An extensive analysis of the survey was performed and shared, which was followed by a panel discussion on the survey's results with industry leaders at the conference.

Leadership, test execution, innovation and emerging technologies were identified as the keynotes of the conference. The survey questions, in alignment with the keynotes, were designed to identify the strengths and weaknesses of the current testing services. This could aid in improving and redefining the existing strategies and help organisations deliver quality services.

Participant profile



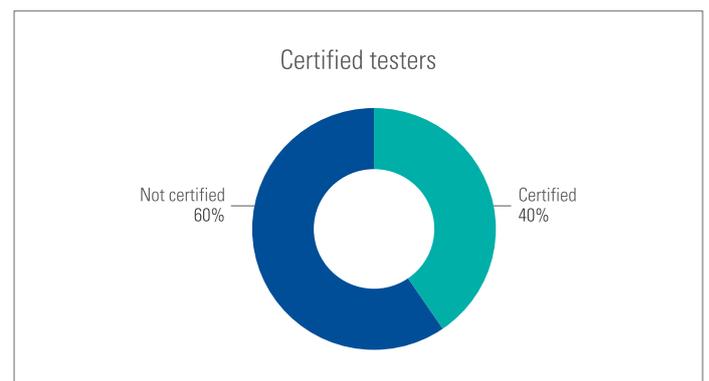
Source: 'World Testing Survey 2015', KPMG in India, conducted in July 2015

Certification profile of surveyed testers

The participation profile segment of the survey was captured to identify the skillset, level of experience and domain expertise of the participants.

Forty per cent of the respondents were certified, mainly leaders from product-based companies and service organisations. Overall, the survey respondents were a versatile group with varied domain expertise and work experience.

Certified testers



Source: 'World Testing Survey 2015', KPMG in India, conducted in July 2015

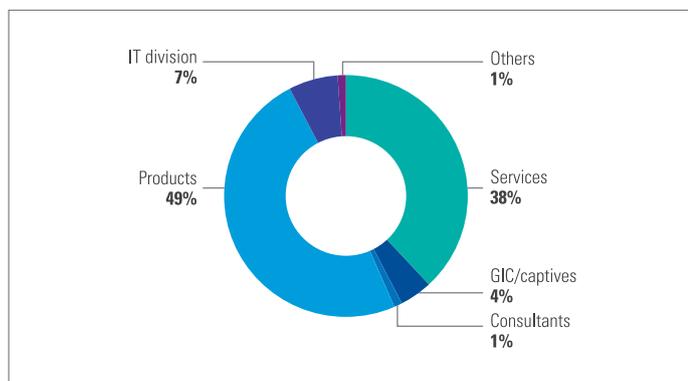
Sector-wise distribution

The organisation type of the surveyed testers was collated during the survey to identify the testing requirements in various groups of companies.

The conference was attended by an assorted group of companies which included service organisations, Global In-house Centres (GIC)/captives, consulting firms, product-based firms, IT companies and others. There was significant participation from product-based companies which indicates their growing interest in testing services and its importance in their realm of operation. This was closely followed by service-based companies reaffirming their presence in the world of software testing.

We believe the eclectic mix of representation from various sectors helped make the results insightful and brought diverse perspectives to the table.

Sector-wise distribution of respondents



Source: 'World Testing Survey 2015', KPMG in India, conducted in July 2015

Software testing – a key business driver

This segment was introduced to comprehend the strategic role of software testing for business processes and its potential effect on application delivery, time-to-market and competitive differentiation.

Advancement of technologies in geometric proportions in sectors viz. social media, mobility, analytics and cloud computing act as enablers to the next generation of technological trends. This market trend mandates the adoption of software testing measures that could yield a higher quality of software with better responsiveness to business demands.

Significance of test processes

Testing, being a critical component of a mature software development process, warrants the institutionalisation of software test processes to perform a regular evaluation of services to facilitate better planning, cost optimisation and identification of improvement areas. Our survey underlines the need for a rational understanding of test strategy and business goals, coupled with defined policies to contribute to the growth of an organisation.

Wide-ranging product functionalities, advanced architectures and colossal support configurations contribute to the development of complex software products. This trend reinforces the need for maximum test coverage to help ensure product quality. Increasing business and margin pressures demands completion of projects within a limited time span and resources. The market drift reinstates the need for automation testing.

1. Leadership



Primary driving factor for outsourcing

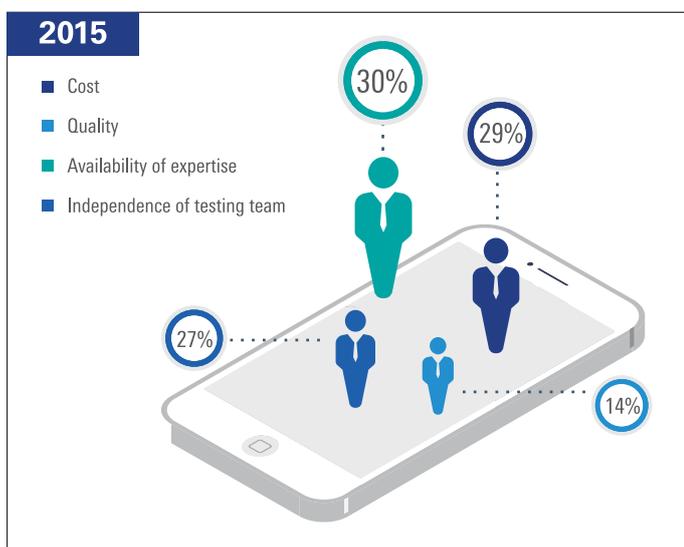
The emerging demand for a 360 degree QA, with a focus on specialised and non-functional testing, makes outsourcing of software testing inevitable.

Outsourcing was evaluated based on multiple factors viz. cost, quality, availability in expertise and independence of the testing team. Although the cost factor has diminished significantly, QA expertise shows progress to be a growing niche in the testing market with automation, artificial intelligence (AI) and other disruptive technologies making a significant impact across avenues.

The insights garnered from the survey suggest that most of the organisations depend on in-house testing capabilities to execute test activities, and opt to outsource skilled resources in performance testing, security testing, etc. based on their requirements. Thus reducing the cost incurred by the organisation.

Inception of flexi-team approaches including staff augmentation and outsourcing, mitigates timely delivery of applications regardless of the high level of software complexity and fluctuating business demands. Selection of an experienced testing partner with industry expertise and structured processes is an acceptable outsourcing strategy.

Factors driving outsourcing



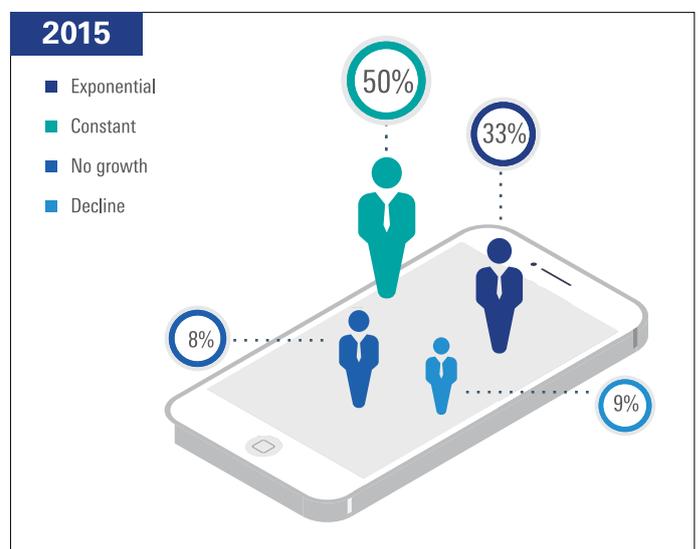
Source: 'World Testing Survey 2015', KPMG in India, conducted in July 2015

Expected growth of software testing in the near future

The results of the 2015 World Testing Survey conducted by KPMG in India indicate the year witnessed the dwindling growth of the IT market. Nevertheless, nearly 33 per cent of respondents expect the market to grow exponentially as businesses have matured in terms of making IT central to all business processes. Hence, there is a very high level of business dependence on error-free software code.

The inferences gained from the World Testing Surveys conducted by KPMG in India between 2013 – 2015 mark a shift in the growth paradigm of software testing. Whilst software testing witnessed exponential growth in the years 2013 and 2014, the growth became constant in the year 2015. This shift can be attributed to the stable growth of IT industry.

Testing growth in the future



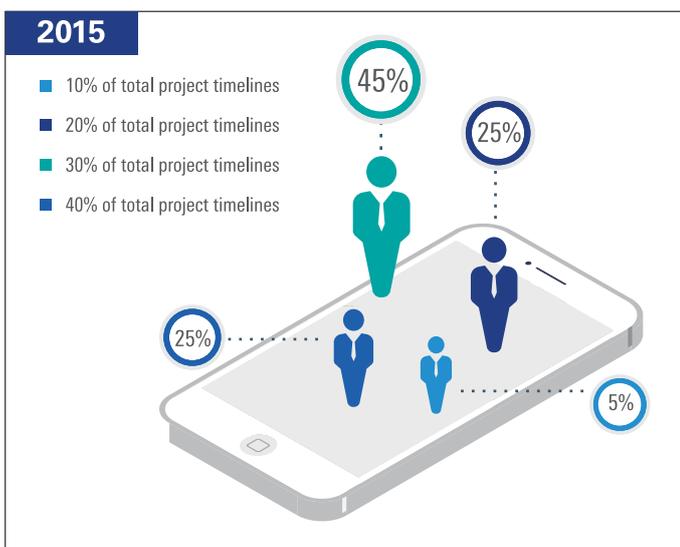
Source: 'World Testing Survey 2015', KPMG in India, conducted in July 2015

Focus on testing activities in project timelines

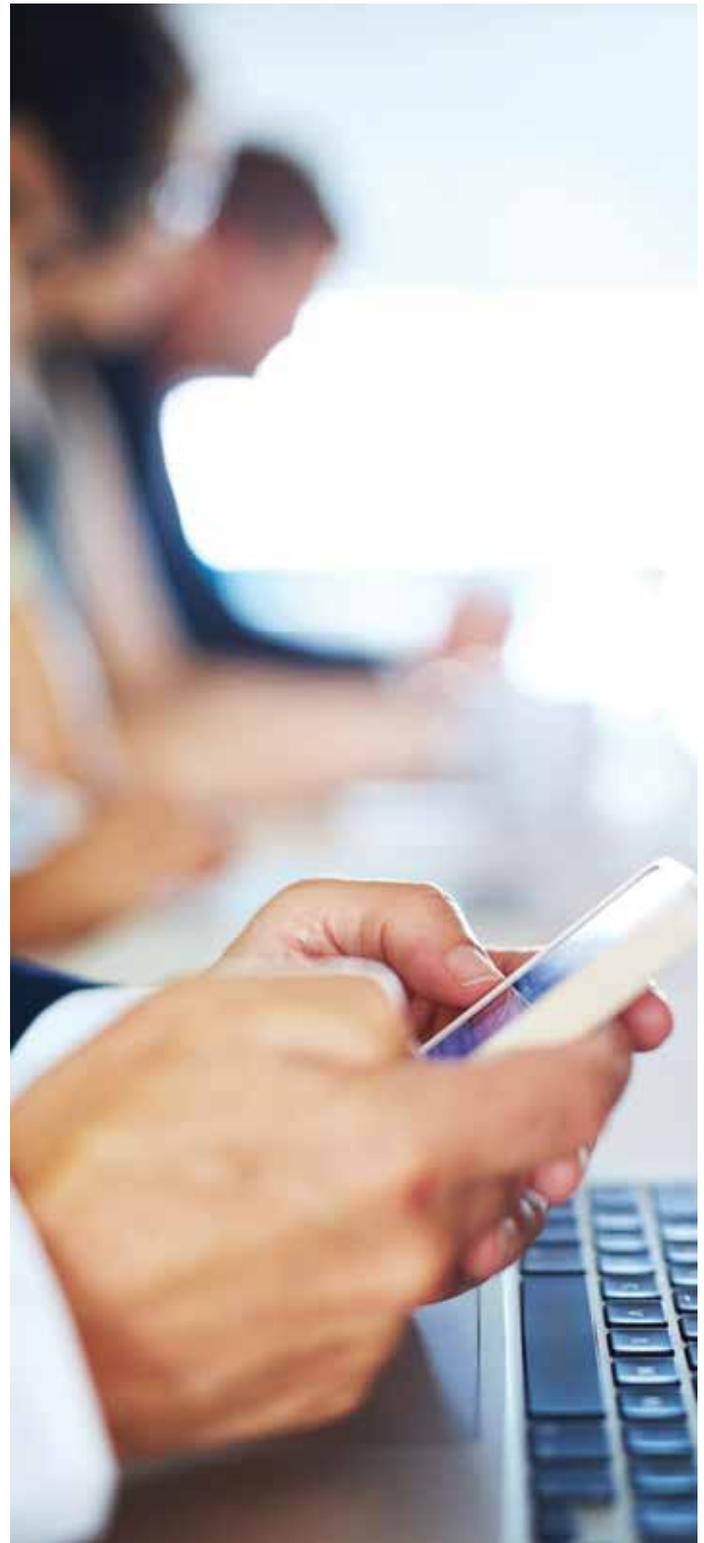
Software testing is an integral and critical phase of any software project that typically takes up almost 30 per cent of a software development life cycle. The survey reaffirms percentile testing needs irrespective of the dynamic market trends.

Developers and testers must ensure that new products or product enhancements meet functional and performance requirements, and can be relied on to operate consistently during peak load.

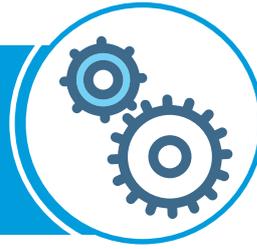
Share of testing



Source: 'World Testing Survey 2015', KPMG in India, conducted in July 2015



2. Test execution



Percentage of test automation

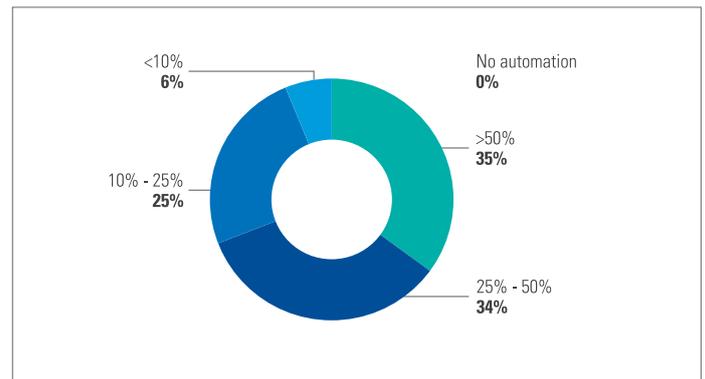
The survey revealed a significant leap in the percentage of test automation achieved in organisations, and served as an effective litmus test to gauge the significance of it in the market.

It affirmed that more than 50 per cent of test automation is employed in organisations today, which delineates its steady growth, propelled by the prolific influx of open source and commercial test automation tools in the market.

The demand for automation testing can be attributed to the pressing need to deliver quality most often within stringent timelines.

The fact that we have zero representation for the 'No automation' space indicates that automation testing is the way forward and colossal growth in this space is inevitable. This also highlights the maturity of the testing industry.

Test automation percentage



Source: 'World Testing Survey 2015', KPMG in India, conducted in July 2015



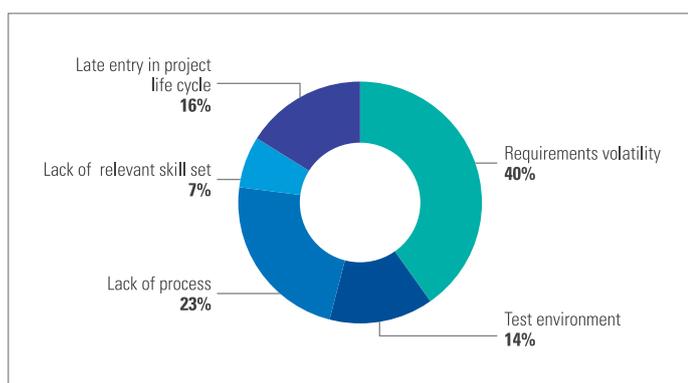
Foremost challenges in test execution

Requirements volatility and a lack of streamlined processes were identified as pre-eminent challenges in the area of test execution. Changes in the requirements during the course of the software development lifecycle are constant and pose potential risks to the cost and quality of the product.

Requirements volatility expresses the tendency of requirements to change over time in response to the evolving needs of the customers, stakeholders, organisations and work environment. Paucity of frameworks in organisations to oversee thorough and periodic introspection of their processes and delivery capabilities is common. We believe TMMi and other process improvement frameworks can ameliorate this challenge since it can address changes irrespective of the extent of change being introduced in the business.

The late entry of software testing in the project life cycle remains a compelling challenge. A conscious effort to involve testing at the beginning of project life cycle will help overcome the challenges listed earlier.

Test execution challenges



Source: 'World Testing Survey 2015', KPMG in India, conducted in July 2015

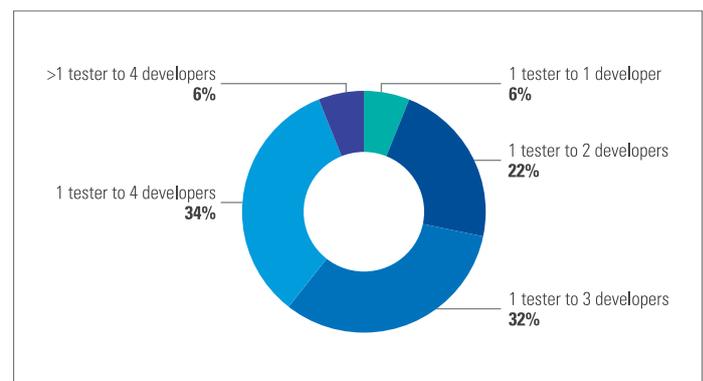
Tester to developer ratio

The tester to developer ratio is an elusive factor in the world of software development, with no tangible correlation between the number of testers and developers.

As there is no all encompassing approach in place, it may be prudent to explore the capabilities of developers and testers in depth, and focus more on an extensive collaboration of team members to ensure increased end-customer satisfaction.

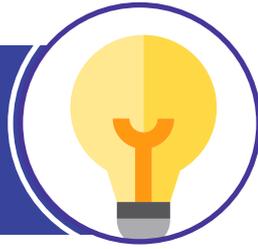
The most accepted ratio of tester to developer in this survey is 1:4, closely followed by 1:3. This is a testimony to the increasing levels of automation to expedite the process of achieving maximum quality within shorter time frames.

Effective tester to developer ratio



Source: 'World Testing Survey 2015', KPMG in India, conducted in July 2015

3. Innovation



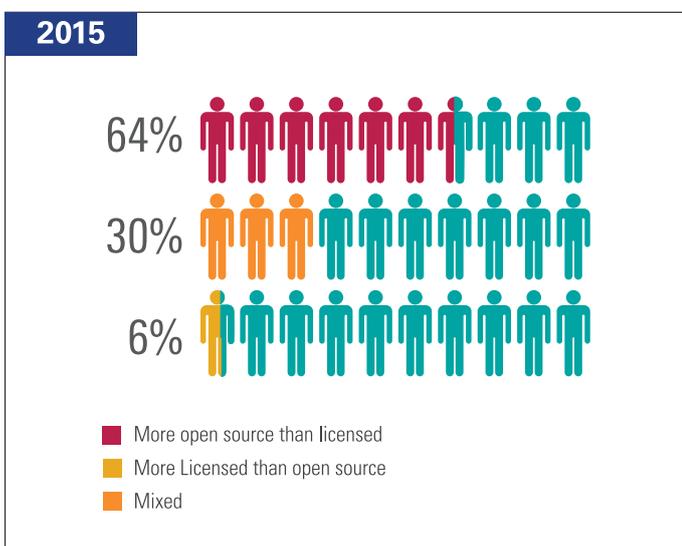
Testing tool usage – open source versus commercial

A scaling usage of open source testing tools was recorded as opposed to Commercial off-the-shelf tools (COTS). Cost associated with the tools, customisation capability to tailor evolving business requirements, and interoperability facilitated by the adherence to open standards are some key factors to be considered regarding open source tools.

Conversely, COTS guarantees one-on-one support to help ensure that the software functions properly and is far less susceptible to hackers. Both open source and COTS have their own strengths and they both have a place in the market. Investing time and effort in the exploration of tools in terms of return on investment can further establish automation as a potential long-term solution for reduced costs in software testing and better quality products, provided leading industry practices are adopted while implementing the tool.

An in-depth analysis of our survey results suggest that companies from sectors such as BFSI and healthcare, which are governed by regulatory compliance, opt for COTS tools, as they foresee the involvement of critical user data. The survey results also suggest a profound demand for open source tools in the ecommerce sector primarily due to greater user dependency.

Tools usage



Source: 'World Testing Survey 2015', KPMG in India, conducted in July 2015

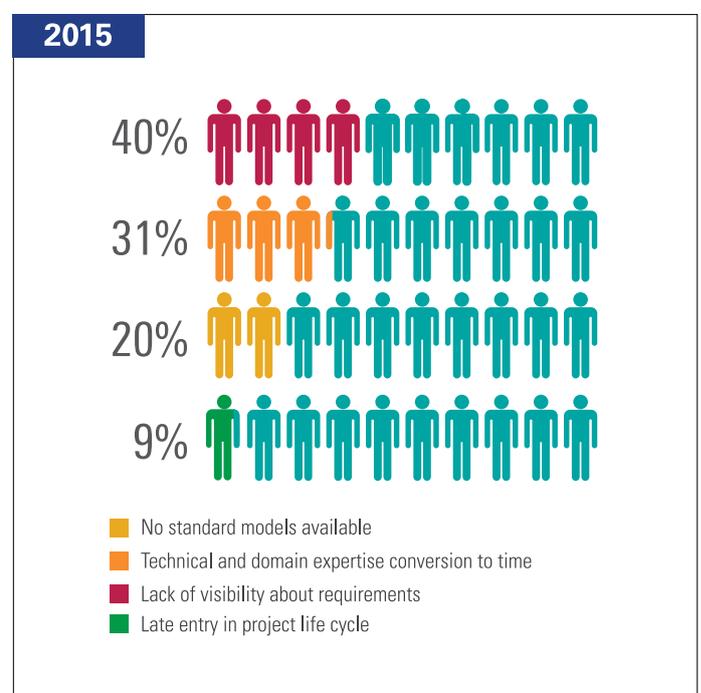
Software test effort estimation challenge

Accurate effort estimation is an indispensable aspect, as it is the preliminary phase between the client and the business enterprise, as the credibility of the former to the latter increases with accurate estimation.

The survey performed an in-depth assessment of the various challenges viz. absence of standard models in place, conversion of expertise to time, absence of requirements visibility, and late entry in project life cycle.

The absence of requirements visibility at the pinnacle of key challenges is compelling enough a reason to explore and undertake strong groundwork in terms of knowledge and competency building to overcome these challenges.

Software test effort estimation challenge



Source: 'World Testing Survey 2015', KPMG in India, conducted in July 2015

Effective utilisation of testing metrics

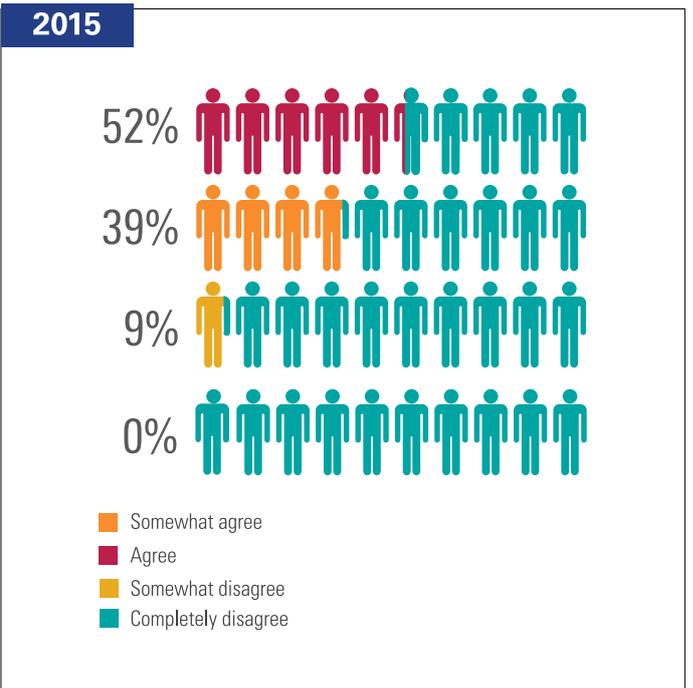
The survey gathered that a majority of the respondents concur on the utilisation of testing metrics as an efficient practice to identify issues, analyse progress and take corrective action before it is too late.

Tracking the quality of software development and testing efforts is absolutely critical to accurately gauge the current state of an organisation's health and success. At every level of development, from QA staff members to executives and individual testers to company-wide productions, reliable data is needed to ascertain the quality of current processes and whether changes need to be made to improve operations.

The survey indicated a shift in paradigm from development, the focus is now on improving the existing testing mechanisms through feedback by asking the right questions. The feedback mechanism is instrumental in ensuring overall quality control.

Implementing the right testing metrics can help an organisation remove inefficiencies and position itself for success. By incorporating a sophisticated software test management system, developers and testers can enhance the value of these assets, facilitating the availability of metrics across the entire enterprise.

Is metric utilisation effective?



Source: 'World Testing Survey 2015', KPMG in India, conducted in July 2015



4. Emerging trends

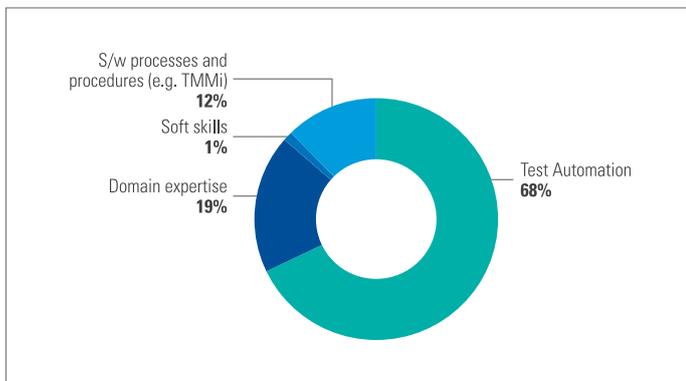


Areas of focus for next generation testers

Whilst the survey observed a salient rise in the demand for automation, it also recorded an imperceptible increase in the demand for domain expertise. Application of domain knowledge is likely to be instrumental in making effective decisions at every stage of the life cycle.

Consumers, being more wary of the quality of IT applications they come into contact with, and their easy access to rate the apps and instantly express their feedback, carries great weightage for businesses today. Respondents confirmed that since delivering high quality software within tight deadlines is the need of the hour, this further reiterates the significance of test automation and the rising need for automation testers.

Areas of focus



Source: 'World Testing Survey 2015', KPMG in India, conducted in July 2015

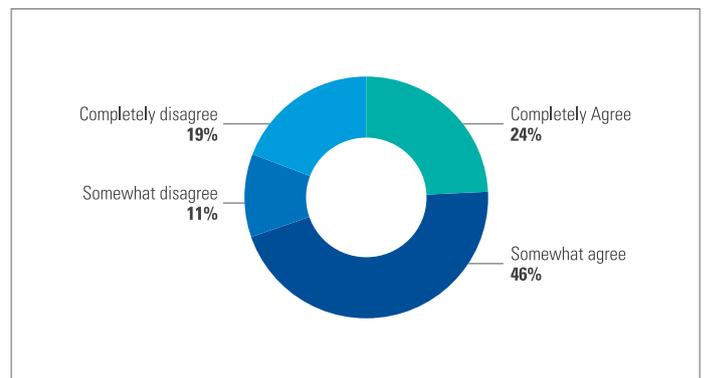
Leveraging development experience to improvise software testing

Application delivery time, quality, and cost being quintessential factors that propel business growth, there is a phenomenal demand for testers with prior development experience.

The survey further revealed that almost 70 per cent of the respondents were of the perception that tapping into developmental expertise can proffer better insight on code and can help reduce the time to troubleshoot defects.

With the profound growth and demand for automation testing, the survey observed an increasing need for development skills in terms of coding. This expedites the time required to troubleshoot defects and helps to deliver quality results within stringent timelines. Conversely, the advent of scriptless automation tools mean that coding skills are no longer a necessity, and underscore that business flow is now of paramount importance.

Is development experience a necessity?



Source: 'World Testing Survey 2015', KPMG in India, conducted in July 2015



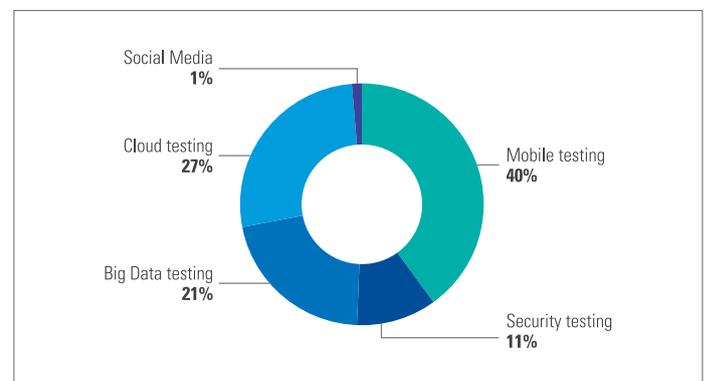
Areas with the highest potential for innovation

The survey highlighted the predominance of mobile testing and growth in cloud testing owing to the progress in cloud-based technologies in the market. This marks the end of an era of legacy testing.

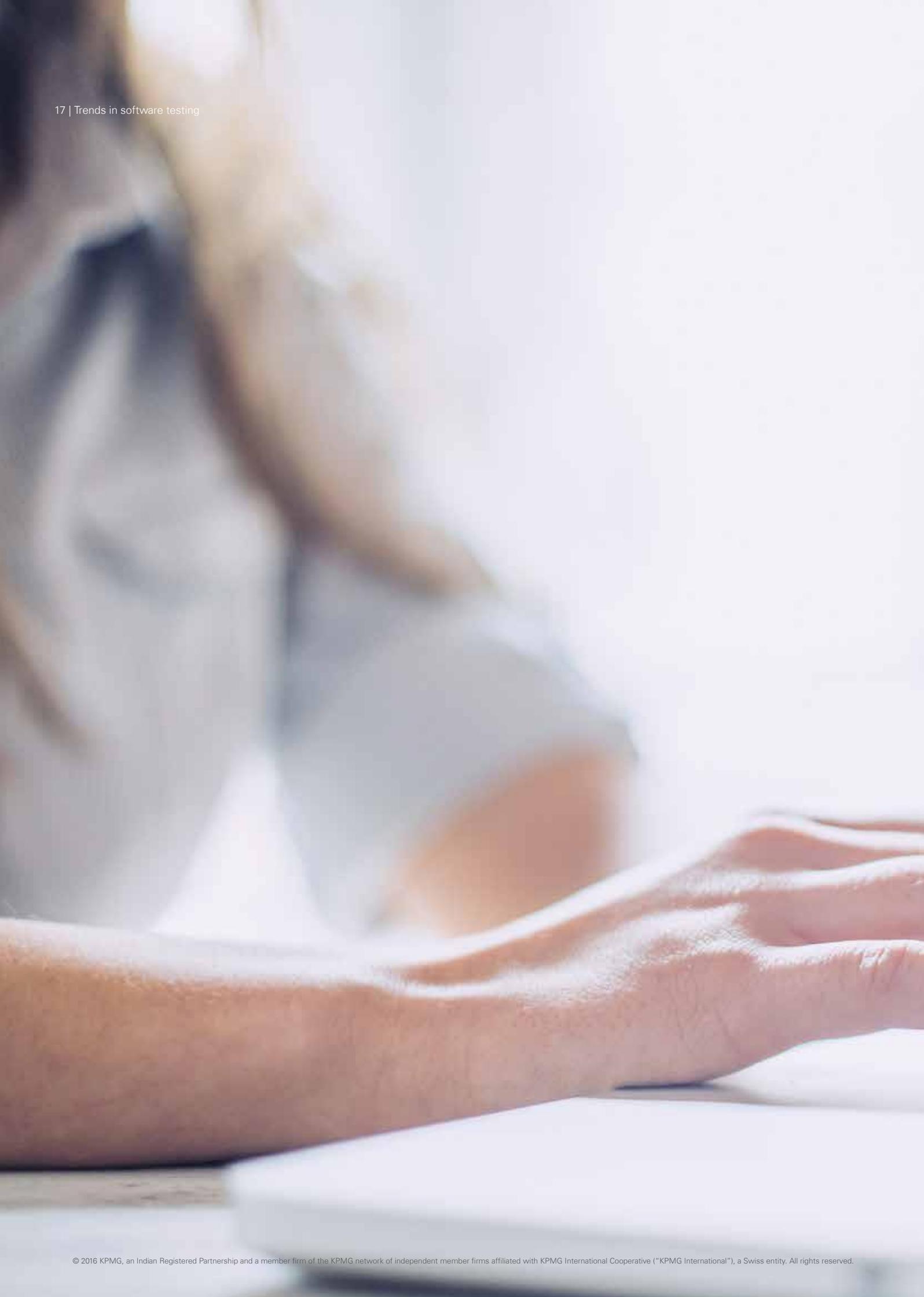
With rapid changes in mobile technologies, businesses are expecting matured mobile testing practices from organisations. Software testing applications should be able to support a wide range of devices and operating systems, which could help in the creation of multiple test scenarios/executions across multiple platforms.

The advent of futuristic technology/devices propels the testing industry to devise innovative ways of testing.

Is development experience a necessity?



Source: 'World Testing Survey 2015', KPMG in India, conducted in July 2015



Conclusion

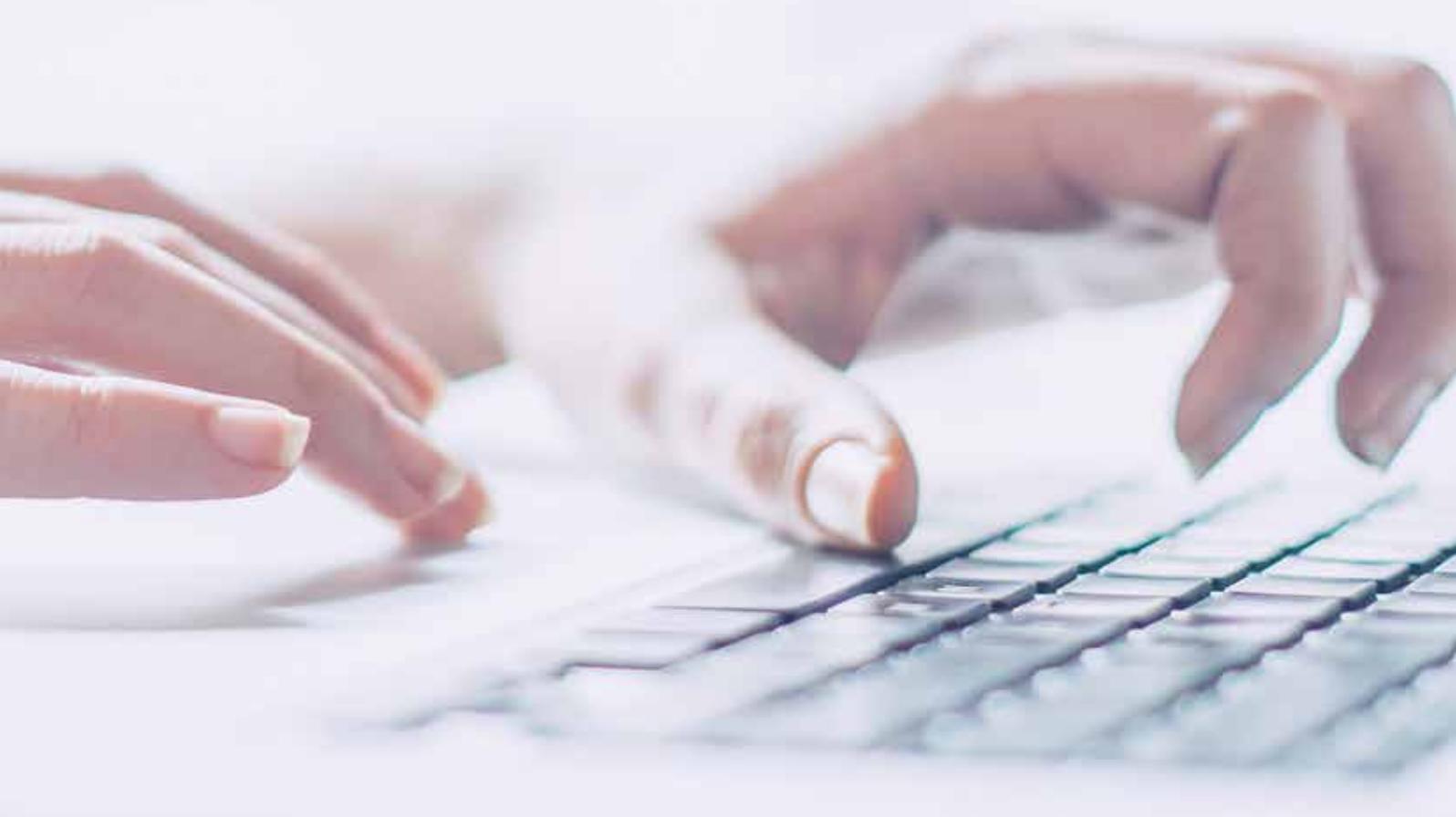
The inferences from our survey and market research charted three key areas where improvisation is needed, namely: exploration in terms of Return on Investment (ROI) of test automation tools, adoption of test process improvement models such as TMMi, and enhancement of testing services around mobile testing and cloud testing.

Potential unpredictable losses in revenue, irredeemable damage to the brand and reputation of organisations, and undesirable effects on customers, together necessitate software Quality Assurance (QA). Digital transformation, over the last few years, has ushered in an increase in the usage of Social media, Mobile, Analytics and Cloud technologies (SMAC), thereby resulting in the crystallisation of the concept.

The software testing services market currently envisages a constant growth in verticals namely the Banking, Financial Services and Insurance (BFSI), telco, retail, government and manufacturing sectors.

As automation is being widely used, a comprehensive study of open source automation tools in terms of ROI is imperative to tailor cost-effective solutions. Improved test processes aim to detect defects as close as possible to their source to help lower correction costs and give information about the system quality as early as possible. In this context therefore, implementation of test process improvement models such as TMMi can contribute to the better performance of the total information services as confirmed by our survey respondents.

The aspects of social concepts are also driving the way software is being built at every phase of development, testing and further maintenance. A strategic and comprehensive testing approach must be adopted so that the end-to-end platform can help deliver enhanced benefits, as compared to those derived from testing SMAC elements independently.



KPMG in India contacts:

Nitin Atroley

Partner and Head

Sales and Markets

T: +91 124 307 4887

E: nitinatroley@kpmg.com

K. K. Raman

Partner

Business Excellence

T: +91 80 3065 4700

E: kkothandaraman@kpmg.com

Prasanth Shanthakumaran

Partner

Business Excellence

T: +91 80 3065 4407

E: prasanths@kpmg.com

Rajesh Kannan

Associate Director

Business Excellence

T: +91 80 3065 4677

E: rajeshk@kpmg.com

[KPMG.com/in](https://www.kpmg.com/in)

Follow us on:

[kpmg.com/in/socialmedia](https://www.kpmg.com/in/socialmedia)



The information contained herein is of a general nature and is not intended to address the circumstances of any particular individual or entity. Although we endeavour to provide accurate and timely information, there can be no guarantee that such information is accurate as of the date it is received or that it will continue to be accurate in the future. No one should act on such information without appropriate professional advice after a thorough examination of the particular situation.

The views and opinions expressed herein are those of the interviewees and do not necessarily represent the views of KPMG in India.

© 2016 KPMG, an Indian Registered Partnership and a member firm of the KPMG network of independent member firms affiliated with KPMG International Cooperative ("KPMG International"), a Swiss entity. All rights reserved.

The KPMG name and logo are registered trademarks or trademarks of KPMG International.

This document is meant for e-circulation only. (012-THL0616)