

Quality@Speed Is The Key To Digital Success

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Executive Summary

Empowered customers are shaping business strategy. Simply put, customers expect consistent and high-value in-person and digital experiences. They don't care if building these experiences is hard or requires a complex, multifunction approach from across your business. They want immediate value and will go elsewhere if you can't provide it.

As a result, companies are challenged to meet customer expectations with high-quality software that delivers value to customers at their time of need. Application development professionals are tasked with delivering these digital experiences with an increasing focus on quality and speed, through refining their development, testing, and delivery strategy. Those businesses that fall behind the application arms race risk losing their customers to the competition.

In February 2016, Cognizant commissioned Forrester Consulting to evaluate the demands of speed and quality on application testing in the age of the customer. Then to further explore this trend, Forrester developed a hypothesis that stated that in order for companies to win in the age of the customer, they must make their testing programs more agile and embed testing more thoroughly into their DevOps practices — effectively adopting the concept of DevTestOps.

In conducting an in-depth survey with 500 application development and testing professionals, Forrester found that while many companies today are embracing the importance of digital in theory, they are not universally translating that to a hard focus on software quality and speed, indicating an opportunity for competitors to win the digital arms race if they adopt Agile and DevOps testing practices and tools.

KEY FINDINGS

Forrester's study yielded five key findings:

- › **Quality and speed are of paramount importance in application development.** Nearly half of study participants told us their business leaders demand speed and quality in equal measure. Combining speed and quality was the top factor of application success for 34% of study respondents — the most frequently chosen No. 1 success factor overall.
- › **DevOps and Agile tools and practices enable unprecedented quality@speed.** Respondents who have adopted Agile and/or DevOps realize faster delivery of solutions, better alignment between business and IT teams, improved technical and functional quality, and lower maintenance costs. Agile development requires Agile testing techniques that break down silos, encourage automation, and support the management of complex architectures.
- › **More mature companies lean to end-to-end testing solutions.** Companies that said they were ahead of their competition in responding to digital disruption in their industry were 11% more likely to turn to end-to-end testing services and solutions. They prefer in-house solutions (if they have the capabilities) or use a third party that can integrate best-of-breed approaches and tools in an end-to-end solution.
- › **DevTestOps is the driver of quality@speed.** Practitioners must embed testing into their software production processes. To unlock their digital potential, firms must learn to enrich DevOps by aligning the people, processes, and technologies that remove downstream impediments and increase automation to develop, test, and deploy better software, faster.
- › **Digital is seen as crucial to business, but many companies have not connected the dots on software's role.** While many firms in our study have prioritized software-related functions in their business plans for the coming year, less than half see software as the main key to unlocking business success. As Forrester's data shows, it's software that makes a business digital.

Agile Software Development And Testing Are Key To Winning The Digital Race

Organizations of all sizes, industries, and geographies are challenged to meet the expectations of digitally empowered customers. This shift in customer power represents both tremendous opportunities and existential threats for companies — where all it takes is one great digital experience to win customers from the competition, or one bad experience to lose them forever.

COMPANIES ARE FOCUSED ON IMPROVING DIGITAL EXPERIENCES

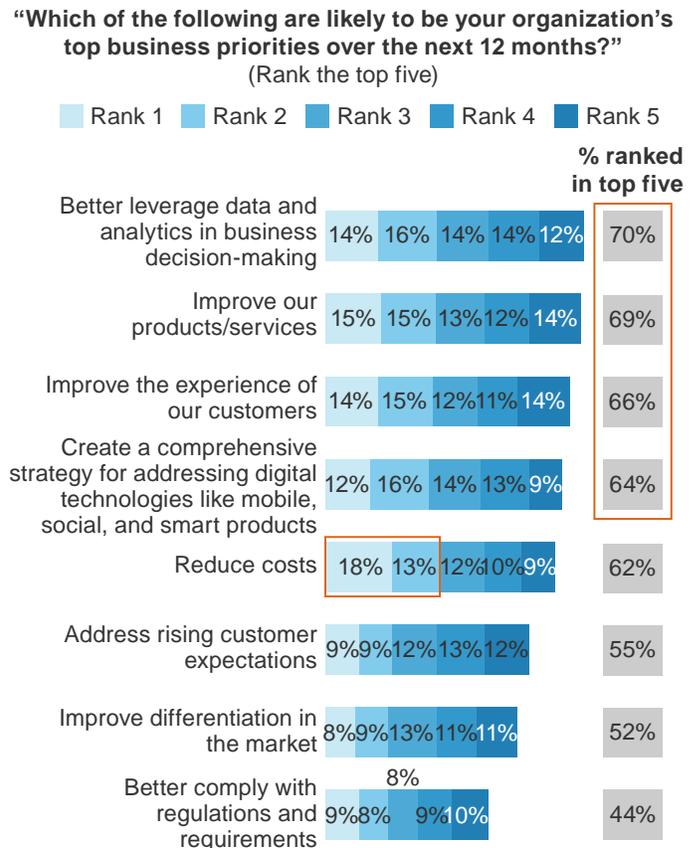
Demanding customers, savvy competitors, and products and services increasingly enriched by software are driving organizations of all sizes, industries, and geographies to improve their software delivery practices. Therefore, it should be no surprise that companies in our study are putting activities that support software development at the heart of their business priorities in the next year (see Figure 1). The need to better leverage data and analytics, improve product and service delivery, and improve the customer experience is front and center in companies' minds today — and 65% said they are focused on creating a comprehensive strategy for addressing digital technologies like mobile, social, and smart devices.

THE IMPORTANCE OF SOFTWARE IS GROWING ALTHOUGH NOT UNIVERSALLY EMBRACED YET

Almost half of companies in our study agreed that software was the key enabler for their business. That is not surprising since software is what makes a business digital. However, slightly more than half agreed that software either played a limited role in driving competitive advantage, or that while it provides significant support for their business, it is not the foundation of the business today (see Figure 2 on next page).

This perspective puts these companies at a potential disadvantage. Increasingly, digital experiences have replaced traditional channels as the place and means where customers are won or lost — overlooking the quality of your digital experiences today is akin to opening the door to your competitors and ushering your former customers inside. Furthermore, it's not just about delivering great customer experiences; it's about delivering these experiences first.

FIGURE 1
Software Development Activities Lead Business Priorities



Base: 500 professionals with influence over their organization's quality assurance strategy

("Other" responses not shown)

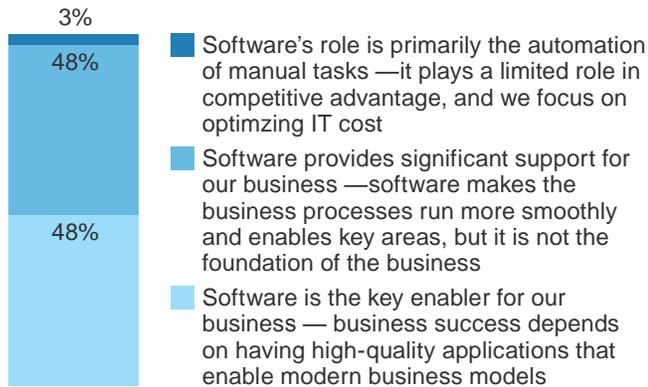
Source: A commissioned study conducted by Forrester Consulting on behalf of Cognizant, September 2016

In order to do so, leading companies have paved the way by planning out the processes, tools, and organizational models that enable companies to deliver digital experiences quickly and with exceptional quality. As they mature, they put the necessary steps in place to ensure delivery happens with both speed *and* quality.

FIGURE 2

Less Than Half Of Businesses Agree That Software Is The Key Enabler Of Business Today

“Which of the following statements best expresses your firm’s attitudes toward software development and delivery?”



Base: 500 professionals with influence over their organization’s quality assurance strategy

(“Other” responses not shown)

Source: A commissioned study conducted by Forrester Consulting on behalf of Cognizant, September 2016

CHOOSING BETWEEN SPEED AND QUALITY IS NO CHOICE AT ALL

IT professionals face unprecedented pressure to deliver digital experiences of high quality, and to do so quickly and within defined budgets. Despite what is heard often in the market about time and budget dominating a project’s success, a third of the participants in our study said that the No. 1 criterion for success was combining speed *and* quality. Quality and speed was the most common No. 1-ranked criterion, beating quality or speed individually; it also beat the bottom-line cost of development, testing, and deployment. Overall, 78% of respondents ranked quality and speed as one of their top four application success criteria (see Figure 3).

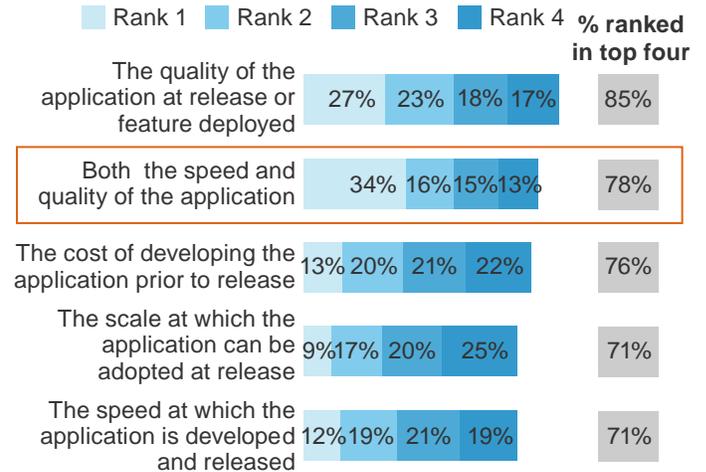
These IT professionals are responding to the demands of business leaders at their companies. Nearly half of respondents in our survey indicated their business leaders were demanding they deliver both speed and quality, and 44% said their business leaders were pushing them to improve user or customer satisfaction with the software they deliver.

One challenge is that sometimes balancing speed, quality, and costs involves compromising on one or more measures. Knowing this, we asked respondents which criterion they

FIGURE 3

Quality *And* Speed Is Top Application Success Criterion

“Please rank the following criteria in terms of how critical it is to a project’s overall success.”



Base: 500 professionals with influence over their organization’s quality assurance strategy

(“Other” responses not shown)

Source: A commissioned study conducted by Forrester Consulting on behalf of Cognizant, September 2016

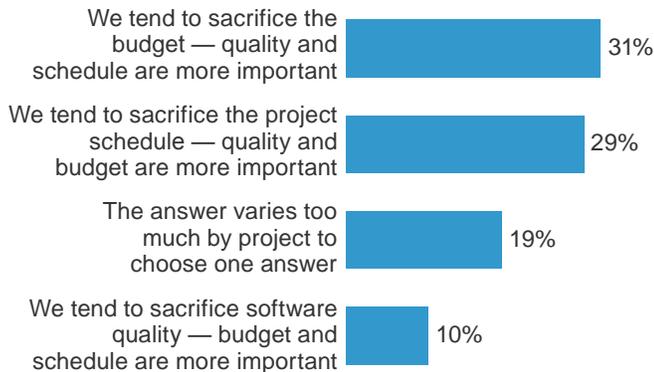
would be most likely to sacrifice project costs on ahead of compromising speed or quality (if they had to choose only one criterion). It’s worth noting that in this question, quality appears to be the No. 1 consideration — 19% more respondents indicated they would sacrifice speed rather than quality if forced to choose between the two (see Figure 4 on next page).

DEVTESTOPS EMPOWERS QUALITY@SPEED

In pursuit of quality@speed, more than half of companies today have adopted DevOps practices as a method in the downstream delivery process to help drive Agile practices. DevOps has helped streamline application releases by removing silo walls between development and operations teams. And while DevOps assumes that testers are important peers in the process, leading organizations need to truly enrich their teams through DevTestOps.¹

FIGURE 4
Teams Most Likely To Sacrifice Project Budget Over Speed, Quality

“When you have to compromise on one of the measures (on schedule, delivering quality, within budget), which of the following apply?”



Base: 500 professionals with influence over their organization’s quality assurance strategy

Source: A commissioned study conducted by Forrester Consulting on behalf of Cognizant, September 2016

The key to meeting business demands for quality@speed is to embed testing into DevOps practices. Adopting a DevTestOps paradigm involves setting a shared purpose among development, testing, and operations. It’s the set of people, processes, and technologies that remove downstream impediments and increase automation to develop, test, and deploy better software, faster.

MOBILE AND SMART DEVICES MAKE DEVTESTOPS A MUST DO

While the benefits of Agile development are clear for meeting customer expectations in a web environment, the explosion of mobile and internet-of-things (IoT) apps and touchpoints will quickly move Agile and DevTestOps to must-do status. Knowing and responding to what your customers need, as well as having increasingly rapid deployments of new features and OS updates, means that IT professionals will come to require processes and tools that link development, testing, and operations to automate governance and process.

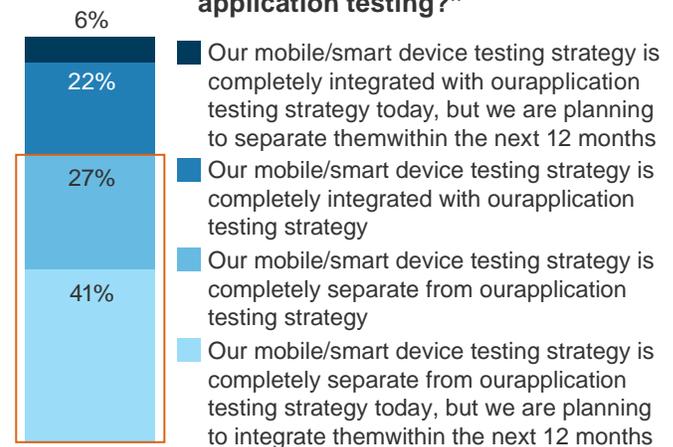
In our study, 65% of companies ranked the need to create a comprehensive strategy for addressing emerging digital technologies like mobile, social, and smart products among their top five business priorities this year. While this is good

planning, we also found that 23% of companies consider challenges associated with managing the complex architectures of cloud and mobile to be significant roadblocks to adopting Agile testing in their organization.

We also saw that companies are still sorting out how to bring mobile and smart device testing into their broader approach to application testing, as 68% told us their mobile/smart device testing strategy was completely separate from their overall application strategy. Among these, however, 41% are planning to integrate them within the next 12 months (see Figure 5).

FIGURE 5
Companies Have Not Yet Integrated Mobile, IoT Into Overall Application Testing Strategies

“Which of the following statements best describes how your mobile/smart device testing strategy is integrated with your overall approach to application testing?”



Base: 500 professionals with influence over their organization’s quality assurance strategy

(“Other” responses not shown)

Source: A commissioned study conducted by Forrester Consulting on behalf of Cognizant, September 2016

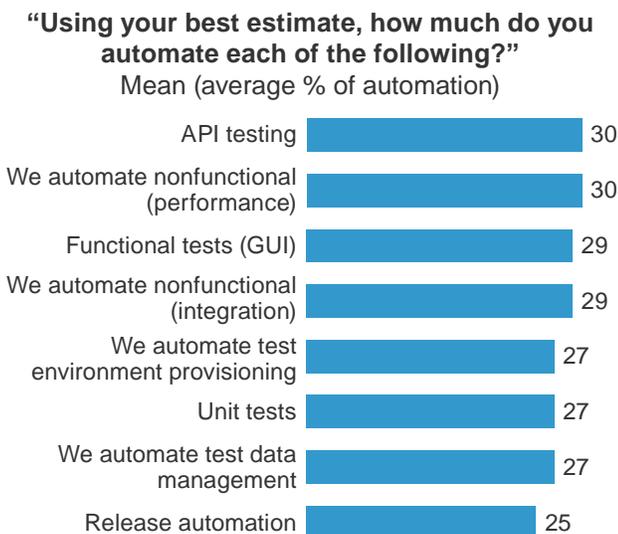
The Journey Toward Quality@Speed Is Full Of Roadblocks

The need for quality and speed together is understood by IT professionals; however, many struggle to effectively deliver against this mandate, as they are hampered by the need for deep cultural change, scattered adoption of best practices that lead to complexity in the tool chain, and organizational structure and internal coordination issues.

LACK OF AUTOMATION IN THE TOOL CHAIN

For example, while best practices such as code scanning and security testing are commonplace for 65% of companies, 67% rely on manual testing at least usually, and 30% said they *always* test manually, raising the risk of both delays and errors. Overall, the companies in our study said they automate testing for critical functions like API testing and nonfunctional (performance) testing an average of 30% of the time — and these are the top areas for testing automation in the study (see Figure 6).

FIGURE 6
Companies Demonstrate Low Levels Of Automation In Testing



Base: 500 professionals with influence over their organization's quality assurance strategy

Source: A commissioned study conducted by Forrester Consulting on behalf of Cognizant, September 2016

Forrester's past research has demonstrated that automated testing is critical to enabling quality@speed. Performing functional regression tests manually, sprint after sprint, kills teams' ability to deliver working software in short cycles.²

MIXED PICTURE OF ORGANIZATIONAL AND PROCESS BEST PRACTICES

In addition to challenges presented by a lack of automation, organizations often struggle to overcome production and testing bottlenecks created by insufficient connections between different teams. Forrester has found that traditional

application development and delivery (AD&D) processes are rife with handoffs, delays, and waiting for things to get done. Siloed organizations have a hard time spotting lags in application development processes because everyone is busy, and the busier they are, the more everyone else who needs their help has to wait.³

Our study also showed that companies still generally favor building centralized testing centers of excellence (TCoEs) versus taking a federated approach to testing. Forrester has found that using TCoEs (which is how 37% of companies in our study have structured themselves) tends to impede Agile development. Since they centralize and execute all testing activities within an organization, they tend to create bottlenecks within a project. They also tend to encourage development teams to think of testing as an afterthought, relegated to the end of the development process, and put responsibility for quality into the hands of relatively few stakeholders.

Federated approaches (adopted by 24% of the companies in our study) overcome these challenges by permanently assigning testing resources to teams and allowing those resources to introduce best practices and shared testing tool strategies more broadly. This means embedding quality into the cycle more organically and avoiding bottlenecks.

There is some reassurance that AD&D teams are starting to address this. For example, 75% of the companies in our study have formed DevTest teams, streamlining coordination between developers and testers working together to remove bottlenecks. Our respondents also show they are moving to better coordinate quality assurance (QA) and business teams, as 76% of companies in our study said they bring together QA and business stakeholders from the very beginning in order to align requirements for the project.

Our study also showed that companies are beginning to follow testing best practices. While, again, testing processes are held back by a general lack of automation in key functions, we did see that from a process standpoint, 87% of companies that rated themselves as digitally mature are following the best practice of testing continuously, iteratively, progressively, and with a lot of automation both from a process perspective and from a test case execution perspective. This saves them from relying on end-of-cycle pushes that can slow things down considerably.⁴

Many companies were enabling feedback from end users to help boost the quality of their applications. We found that 65% of companies in our study were leveraging A/B or

multivariate testing featuring end user feedback as a means of crowdsourcing some of their testing.

Finally, firms in our study were keeping close tabs on security as part of their testing considerations. Nearly two-thirds of the companies we surveyed said that code scanning and security testing were part of their testing procedures either always (29%) or usually (36%).

Firms Are Gearing Up For An Agile-At-Scale Future

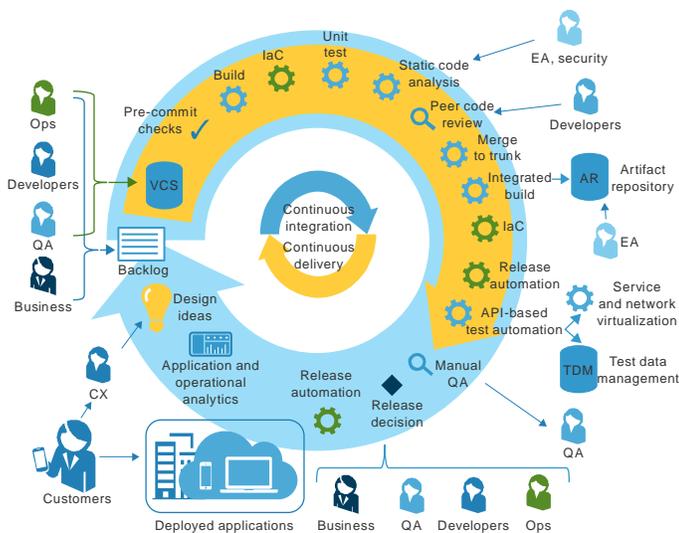
IT professionals are moving Agile, DevOps practices and the tools that enable them front and center, and are now applying them to web, mobile/IoT, and even legacy applications. As they prepare to do this, they find themselves forced to integrate an incredibly complex ecosystem of specialized tools (see Figure 7). Today, there is no one vendor that covers the entirety of the delivery pipeline, and the market is evolving faster than any one vendor can keep up with. This is true even when you only look at the testing layer, where companies must stitch together test management, test data management, functional test automation, and service virtualization and testing tools.⁵

chain. The companies in our study indicated they would be slightly more likely to stay with best-of-breed testing tools (35%) over the next three years, compared with end-to-end large suite vendor solutions (29%). This indicates that consolidation will face an adoption speedbump, as vendors seek to prove their mettle to overcome skepticism over how effective converged tools will be.

Some of that skepticism may be overcome by experience. Interestingly, our study found that companies that indicated they were most mature versus their competition in responding to digital disruption were most likely to favor end-to-end testing services and solutions, with 42% selecting this option. Companies that were on par with their competition tended to favor a best-of-breed approach, selected by 38%. These firms prefer in-house solutions (if they have the capabilities) or use a third party that can integrate best-of-breed approaches and tools in an end-to-end solution

Companies in our study were overwhelmingly open to partnering with outside firms for help with testing. Specifically, there is a real appetite in the future for converged testing solutions, with nearly a quarter of companies saying having an end-to-end testing service would be an important capability for a testing partner — ahead of Agile testing services and customer experience testing (see Figure 8 on next page).

FIGURE 7
The Complex Application Delivery Pipeline Tool Chain

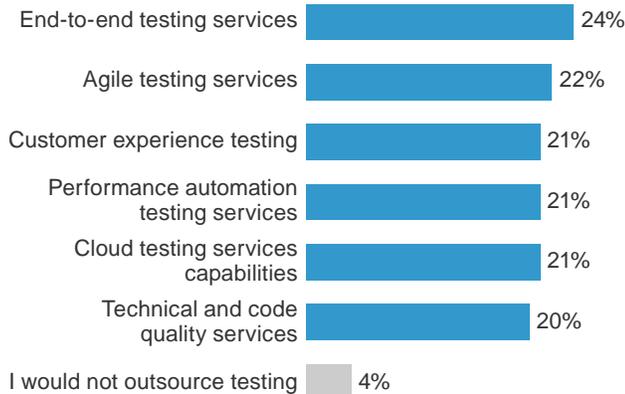


Source: Forrester Research, Inc.

This has created a substantial market for integrators, as well as an emerging trend toward consolidation through the tool

FIGURE 8
Companies Are Open To Third-Party Testing Support

“Which of the following are the most important capabilities you would want from a partner to address your organization’s digital strategy?”

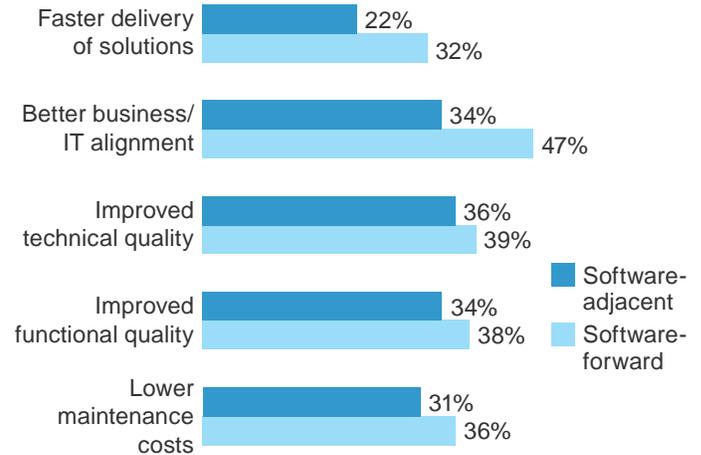


Base: 500 professionals with influence over their organization’s quality assurance strategy

Source: A commissioned study conducted by Forrester Consulting on behalf of Cognizant, September 2016

FIGURE 9
Software-Forward Companies More Likely To Experience Business Benefits

“Which of the following benefits has your company realized through using Agile and/or DevOps?”



Base: 482 professionals with influence over their organization’s quality assurance strategy

Source: A commissioned study conducted by Forrester Consulting on behalf of Cognizant, September 2016

Agile And DevOps Practices Drive Significant Business Benefits

Our study found a strong link between adoption of Agile and DevOps tools and practices and achieving faster, higher-quality results. Respondents who have adopted Agile and/or DevOps realize faster delivery of solutions (41%), better alignment between business and IT (40%), improved technical and functional quality (38%), and lower maintenance costs (34%).

Furthermore, the companies in our study that agreed that software is the key to business success (software-forward companies) were more likely to attribute success to adoption of Agile and DevOps practices, compared with firms that felt that while important, software wasn’t the key differentiator for their business (software-adjacent companies). Specifically, they were 11 percentage points more likely to report faster delivery, 13 percentage points more likely to report better business and IT alignment, and were slightly more likely to report better technical and functional quality and lower maintenance costs (see Figure 9).

Key Recommendations

Agile and DevOps practices are crucial for delivering against the demands of digital business, which requires an unprecedented level of quality and speed. By focusing more on automation, along with shift-left testing practices, companies will gain competitive advantage today and avoid the risk of being left behind as the rest of the market catches up. Forrester's in-depth survey of IT professionals has prompted the following key recommendations:

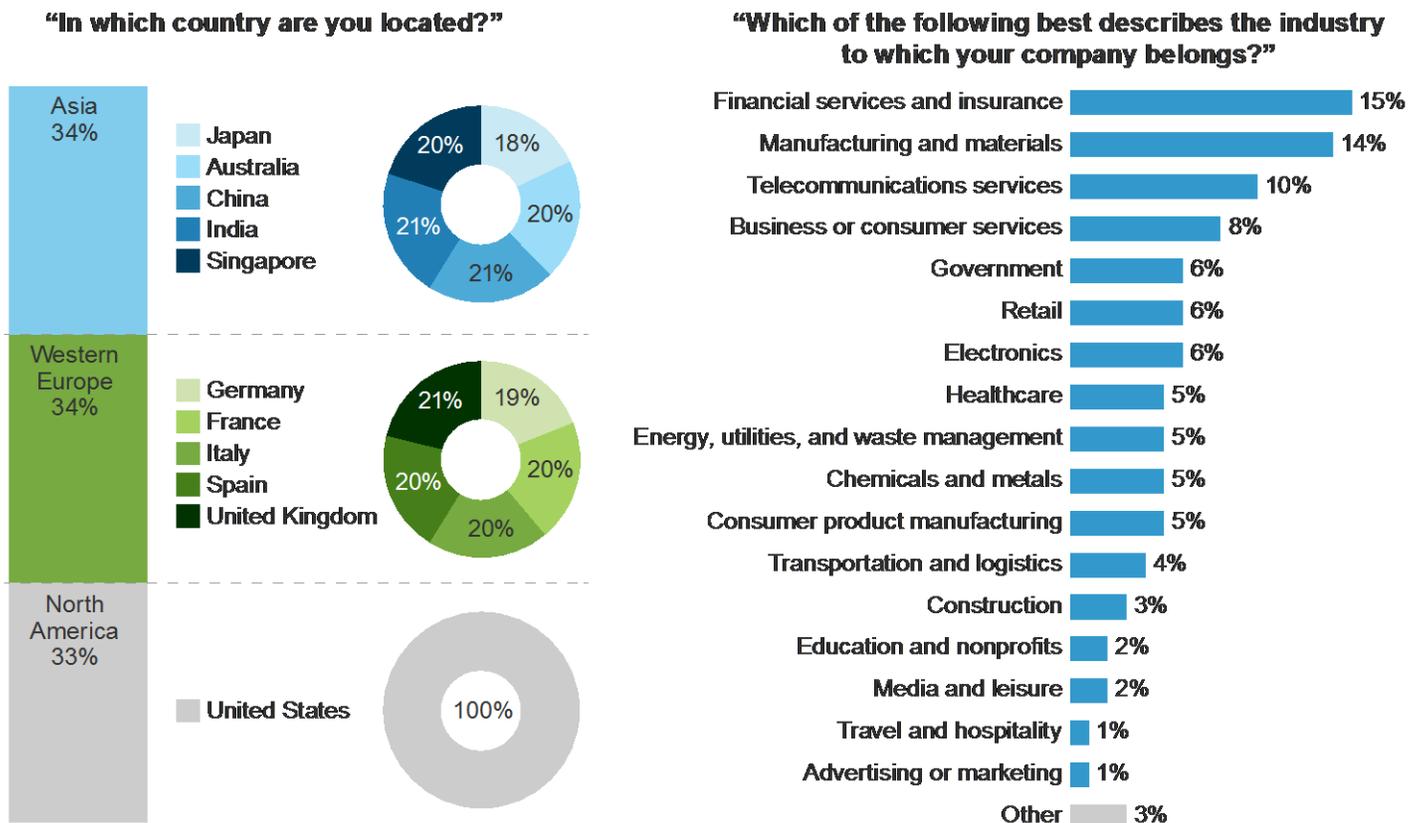
- › **Drive digital innovation for your company.** While it's commonplace to recognize the central role of digital experiences today, many companies have failed to make the connection between digital innovation and the role that software development, testing, and deployment necessarily play in making that digital vision a reality. This represents an opportunity for competitive advantage among companies that can heed their software evangelists and drive the complex process, organizational, and tool decisions that go into running teams that deliver software quickly and with high quality.
- › **Understand that software is what makes your business digital.** The way you develop, test, and deliver software matters now more than ever. Teams have to build quality in from the very beginning and not leave it as an afterthought. In racing, every second matters. Top F1 pit teams have reduced pit stops from 8 to 10 seconds to 2.1 to 2.3 seconds. In that time frame, they change for tiers and keep the quality of the racing car high. Pit stops are central to winning the race and require more speed. A similar culture of quality@speed needs to be seeded in real digital teams. Testing must improve overall quality but also enable faster speed.
- › **Get rid of clunky organizational and process silos.** A key step in smoothing collaboration and optimizing the process involved in development, testing, and deployment is federating testing functions. Reducing the sharing of resources across projects reduces time wasted switching contexts, reduces meeting overhead, and improves application delivery speed. Keep a strong central but small testing team for harvesting testing best practices, building automation artifacts, supporting teams to test within DevTestOps capabilities, and dealing with other specialized testing practices like end-to-end performance or provisioning test data management.
- › **Embrace and seek high levels of automation in testing.** The benefits of automated testing are evident for speed and quality, yet many companies are still struggling to embed automation into their testing practices. Seek for vendors that know how to do this. Smart automation testers will look to automate beyond the UI, test APIs, and take an architectural approach to test automation. A strong partner can help ramp up implementation of testing automation quickly — it will be a competitive advantage today and will quickly become table stakes in an increasingly mobile, connected world.
- › **Prepare to drive digital innovation with DevTestOps.** DevTestOps will ensure testing becomes an integral lynchpin of DevOps. Adopting Agile testing practices and emphasizing the need to combine testing with development and operations will provide more sustainability to fast innovation cycles to win, serve, and retain customers in digital transformations. The DevTestOps paradigm will become even more crucial in the near term with further consumer adoption of new devices, including proliferating mobile and smart device touchpoints, requiring businesses to adopt end-to-end testing practices to support an ever-greater number of applications and requirements.

Appendix A: Methodology

In this study, Forrester conducted an online survey of 500 application development and testing professionals in Asia, Western Europe and the US to evaluate the demands of speed and quality on application testing in the age of the customer. Survey participants included decision-makers in an IT role at their company. Questions provided to the participants asked about their current application testing policies and processes. Respondents were offered a small monetary incentive as a thank you for time spent on the survey. The study began in May 2016 and was completed in September 2016.

Appendix B: Business Demographics

FIGURE 10
Geographical And Industry Breakdown Of Respondents



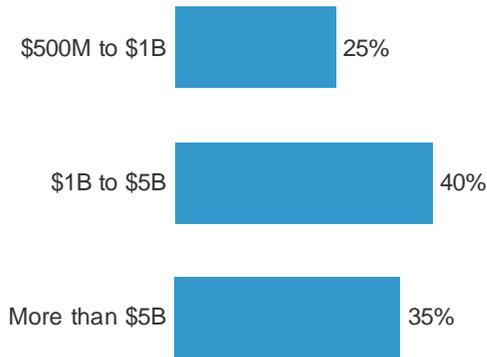
Base: 500 professionals with influence over their organization's quality assurance strategy

(Percentages may not total 100 because of rounding)

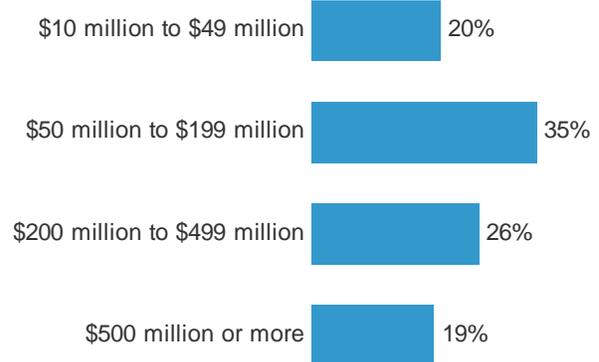
Source: A commissioned study conducted by Forrester Consulting on behalf of Cognizant, September 2016

FIGURE 11
Revenue And IT Budget Breakdown Of Respondents

“Using your best estimate, what is your organization’s annual revenue (USD)?”



“Approximately what is the size of your annual IT budget in US dollars?”



Base: 500 professionals with influence over their organization’s quality assurance strategy

Source: A commissioned study conducted by Forrester Consulting on behalf of Cognizant, September 2016

Appendix C: Endnotes

¹ Source: “Agile Experts Focus On Downstream Delivery,” Forrester Research, Inc., October 5, 2015.

² Source: “The Quest For Speed-Plus-Quality Drives Agile And DevOps Tool Selection,” Forrester Research, Inc., May 5, 2016.

³ Source: “Forget Two-Speed IT; DevOps Enables Faster Delivery Across The Board,” Forrester Research, Inc., November 6, 2015.

⁴ Source: “Agile Experts Focus On Downstream Delivery,” Forrester Research, Inc., October 5, 2015.

⁵ Source: “The Quest For Speed-Plus-Quality Drives Agile And DevOps Tool Selection,” Forrester Research, Inc., May 5, 2016.