

WORLD QUALITY REPORT

2011/12



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Preface

RAF HOWERY

VP, Global Channels & Partners Executive
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Welcome to the third edition of the *World Quality Report*. Those who read the previous reports will find this edition is much more inclusive, with coverage of the quality markets by industry and by different and expanded geographies. This year we have over 20 experts contributing differentiated content in order to provide our readers with a comprehensive view of the testing market. With this issue we establish the baseline on which we will build our future publications that we plan to continue to publish annually in June.

With the radical changes taking place in the IT market, from the introduction and disruption of cloud services to the increased demand for mobility and the explosive demand for smart and integrated devices, we will require reliable applications and infrastructure. This burden will be carried by the testing communities. For this reason, Capgemini has consolidated its significant investment in the testing space in order to provide our clients with reliable and proven methods and, at the same time, delivery capabilities to help meet the pressing and evolving demands of the market.

As the leader in testing space, HP will remain our primary partner. We are excited at the innovation that HP is introducing to this market and we continue to work closely to provide the market with the powerful combination of the best product, best delivery methods and finest overall thought leadership.

I hope that this report meets if not exceeds your expectations. We aspire to inform you, challenge your thinking and inspire your future decisions.

I want to thank HP for its partnership. Mainly, I would like to thank Jonathan Rende for his continued support of this annual report. Finally, I would like to thank the many authors and designers and writers who made this possible, whose names you will find throughout and at the conclusion of this report.

Until next year.

JONATHAN RENDE

General Manager & VP, Application Business
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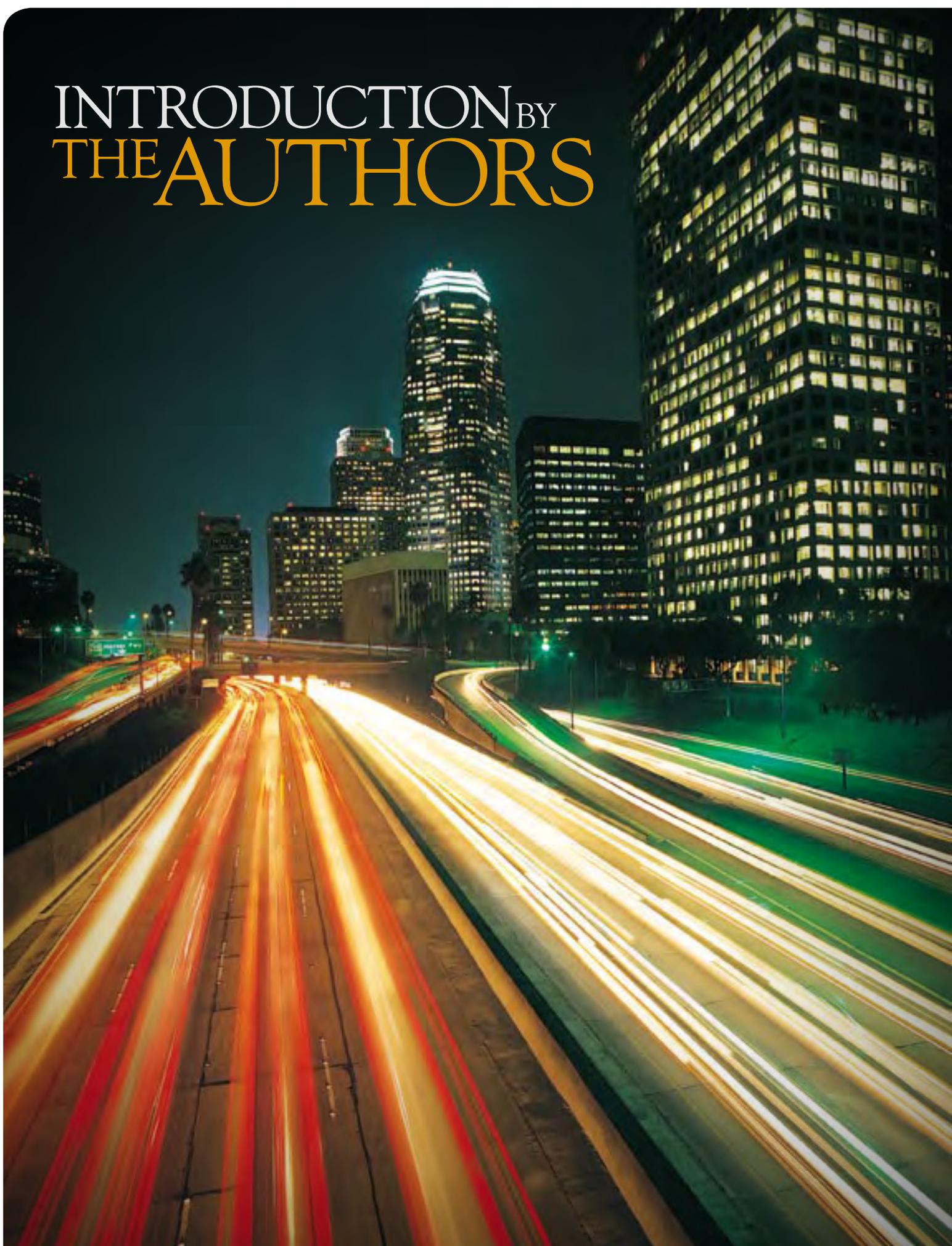
In the last 20 years, we have seen sweeping changes in the world of Quality, Performance, and Application Lifecycle Management. These include technology stack changes, process improvements and new organization models that present organizations with the opportunity to deliver applications at a fraction of the time and cost than was the case in the past. All of this has to be done without compromising quality and performance.

Organizations now need to build and deliver composite applications that integrate to almost every important system within IT (and outside IT). While this is a big enough challenge on its own, requiring a delivery team to do this in the context of a continuous release model while deploying into traditional and cloud environments can be problematic. This new complexity puts an incredible amount of pressure on business analysts, developers and, especially, quality/performance assurance teams.

It is with this in mind that we have recently released our Application Lifecycle Management (ALM) solutions (the next generation beyond Quality and Performance Center). Helping business analysts, manual testers, project managers, performance engineers, quality professionals and developers collaborate together is the core design point of our version 11 releases. That said, on their own creating world class products to help organizations deliver today's applications and services are not enough. They must go hand in hand with world class best practices and services in your organizations to ensure success. That's what makes the combination of HP's expertise in ALM products combined with Capgemini's services expertise such a perfect combination.

I want to again thank Capgemini for the invitation to participate in the third edition of the *World Quality Report*. We are proud to co-sponsor this project and are excited to see how the above industry disruptions will continue to drive positive change in the application industry. Most importantly, I'm excited about how organizations can now find better ways to deliver their applications.

INTRODUCTION BY THE **AUTHORS**



Welcome to the 2011-2012 Edition of the World Quality Report

MURAT AKSU

Global Head of HP Software Alliance
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As economic conditions continue to improve worldwide, IT spending across all industry verticals is once again on the rise. However, good times in IT budgets are over and it's no longer "business as usual". Companies have used the downturn to re-evaluate their IT portfolios, and they are now launching aggressive modernization and globalization initiatives to increase the efficiency of their IT operations. These are sizable undertakings that require substantial initial investments. They are also frequently met with resistance, but this is the only effective way to free up IT resources to support innovation and focus on technologies that will fuel future growth.

The need for innovation is dictated by the consumer. Today's customers are familiar with the convenience of conducting many transactions online from their computers or mobile devices. Companies who aren't able to provide easy-to-use mobile applications are in danger of losing out to the competition. With many core services such as telecommunications becoming a commodity, providers compete for customers by offering value-added products, attractively priced packages, and promises of service quality and reliability. Therefore, it's not surprising to see that today's business leaders view application quality as a competitive differentiator.

Since 2009, Capgemini Group and HP – recognized leaders in application quality – have been publishing an annual *World Quality Report* to help clients stay on top of the latest trends in application quality, methodologies, tools, and processes while helping us to continue to innovate and provide new solutions to solve quality challenges. In this year's report, we examine how companies' IT investments are affected by the economic recovery, identify emerging technology and testing methodology trends, look at the relationship between QA and business stakeholders, and analyze current trends in QA outsourcing. We explore new technologies that could affect a quality paradigm shift such as cloud computing, and profile two distinct testing practices – security testing and measuring quality

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quantitatively using Total Quality Index and technical debt. Keeping with the format of previous reports, the 2011-2012 report includes a detailed profile of the state of IT as it relates to quality in eight specific industries:

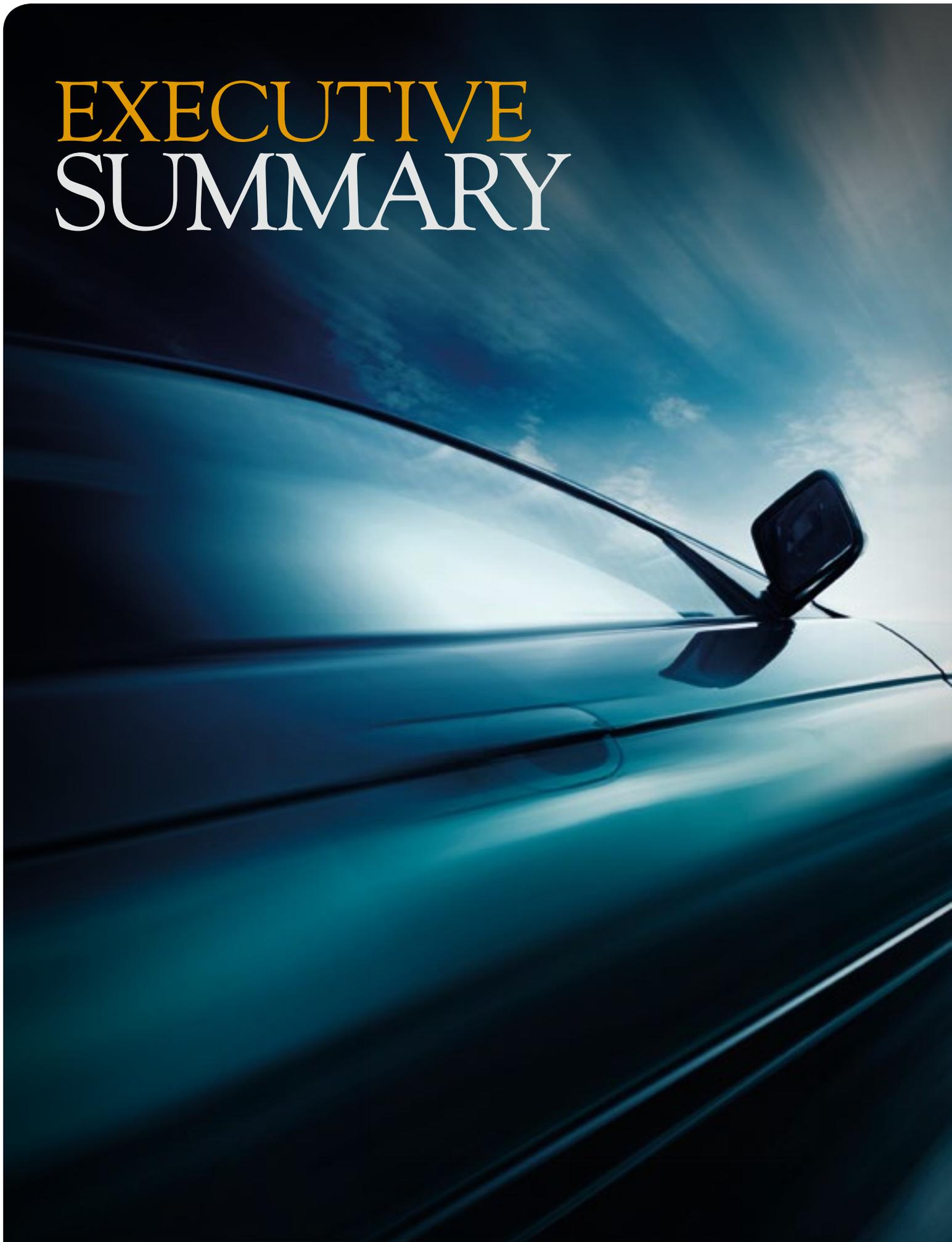
- Consumer Products, Retail, and Distribution
- Energy and Utilities
- Financial Services
- High Tech
- Healthcare and Life Sciences
- Manufacturing
- Public Sector
- Telecommunications, Media, and Entertainment

Finally, this year we incorporate a new section that provides IT trends and quality practices from a regional perspective in the following geographies:

- Australia
- Brazil
- China
- France
- Germany
- The Netherlands
- The Nordic Region
- North America
- United Kingdom

We are pleased that the tradition of the *World Quality Report* is continuing, and we are planning to provide our readers with an updated look at quality trends for years to come. We would like to thank all of the IT professionals who took part in our global survey and contributed to this report. We would also like to recognize contributors from HP, Sogeti, and Capgemini for their immense support and dedication to this research. We hope that the information provided by the report – together with our experts' practical experiences and perspectives – will be beneficial to your company's continued success as you make your application quality decisions.

EXECUTIVE SUMMARY



Key Findings

The *World Quality Report* is a result of ongoing collaboration between Capgemini Group (Capgemini and Sogeti) and HP Software. It presents findings from the 2011 global survey completed online by over 1,200 CEOs, CFOs, CIOs, IT directors and managers, and quality assurance (QA) directors and managers around the globe. The goal of this report is to examine the state of application quality and testing practices across different industries and geographies. Each year, this report looks at current trends in software quality and analyzes emerging tendencies that may affect the future of testing. Survey respondents are asked to provide insights into the state of QA budgets in their companies, answer questions about their testing organization and its relationship with the business, describe their testing practices and methodologies, and share their plans for migrating applications to the cloud. This year, the survey also zeroes in on outsourcing, security testing, and test data management.

The research reveals a number of key findings:

1. The recession has energized IT modernization

- Most companies are coming out of the recession with plans to modernize their IT landscapes – rather than continue spending a large portion of their IT resources on maintaining obsolete and redundant systems.

2. Technological innovation and geographical and sector priorities are driving the future spending of QA

- New technologies and initiatives are increasing the workload for QA teams, but budgets are not growing to support the added pressure. Over half (58%) of surveyed companies say that their QA budgets have stayed the same, decreased, or there is no dedicated budget for testing at all, while only 5% report significantly increased budgets.
- These significant increases in QA budgets are predominantly in emerging markets such as China (83%) and Brazil (56%), suggesting that emerging economies view the investment in QA as strategic for future growth and competitive advantage.
- We also see strong budget increases in specific sectors, fueled by market drivers such as smart energy, healthcare reform and increasing consumerization of mobile technologies.

3. Emerging markets are investing more in quality and the cloud

- Not only are China and Brazil leading the way in increased QA spending, they are also heavily investing in new technologies. Large organizations are investing primarily in setting up a private cloud as part of their IT modernization initiative. Smaller companies use the public cloud infrastructure and services to gain a competitive edge without having to build large data centers and host and maintain their IT systems.
- China and Brazil are among the fastest adopters of the cloud infrastructure. Over a third of Chinese companies (37%) are planning to migrate between 11% and 25% of their applications to the cloud in the next year, and a further 40% are making arrangements to do so.

4. Testing Centers of Excellence (TCOEs) have yet to be fully leveraged

- The concept of TCOEs has been around for almost 20 years, but only a very few mature organizations (10%) have operational centers that are close to being truly industrialized. For the rest, there's a mixed message. Almost half (45%) of companies are building or planning to build a TCOE, while the remaining 45% have no plans at all. The power of this crucial component of QA best practice is still underutilized.
- However, emerging countries are in the lead for centralizing and consolidating QA practices. The growing popularity of TCOEs here suggests that companies that are just developing their QA processes and infrastructures want to get application quality correct from the start.

5. Generating business value is QA's Achilles' heel

- Companies are making a concerted effort to capture and measure the state of quality of applications, with a migration from a qualitative supposition to quantitative measurement. As a result, QA teams that are better equipped at quantifying their value to the business are reaping the benefits of increased budgets and more importantly, improved quality.
- The report finds that more than 80% of companies now collect and report QA metrics. However, out of this number, only 24% use professional business intelligence tools. Most importantly, 16% still do not consistently collect and measure QA metrics which correlates with the 13% who struggle to prove the value of QA to the business.
- Interestingly, as above, 13% of companies also indicate that they do not have a dedicated budget for QA teams. This is not surprising when QA teams still struggle with estimating QA efforts; only 22% use proven industry estimation standards. Dynamic test automation is still generally a work-in-progress with the majority of companies executing up to 50% of their tests without any automation.

6. China and Eastern Europe are increasingly contesting India for outsourcing leadership

- The businesses' reliance on outsourcing continues to increase. Larger companies seem to be more comfortable with the concept of having their QA resources located away from their office facilities. Globally, there is still a strong preference for co-location and nearshore resources (51%).
- However in outsourcing resources, we are starting to see a significant shift. China and Eastern Europe have seen the largest increase in outsourcing preference over the last year. Specifically, within the Manufacturing and Energy & Utilities sectors, China is now by far the leading offshoring location for QA. The outsourcing preference for North America continues to be dominated by India (18%), with China (12%) becoming a preferred alternative location. Western European companies are quite different in comparison, preferring Eastern Europe (12%) followed by China (7%).
- Companies are no longer looking to outsource only manual activities such as test execution. We are seeing an increased demand for resources with well-rounded or specialized skill sets in testing strategy, requirements definition, functional automation, performance testing, user acceptance testing, and security testing.



THE STATE OF QUALITY

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Quality Budgets Are Slowly Increasing

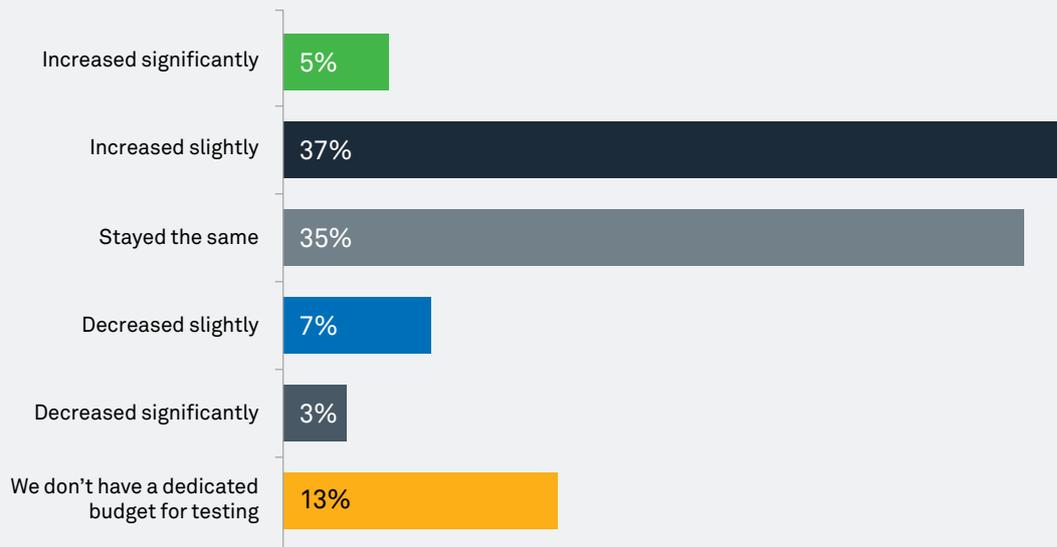
The recent economic downturn has forced businesses around the world to run their IT operations with smaller budgets and fewer resources. Without much money to spend on new application development, IT managers have had to make the best use of their existing systems, ensuring that they function without fail to support the companies' core business processes. This lean approach has increased the pressure on QA teams to put in place solid processes, methodologies, and tools for thorough validation and monitoring of applications' functionality, availability, and performance.

As the economy continues to recover globally, the focus on quality remains vigilant. Most companies are not willing to go back to the old practices of supporting a sprawling landscape of outdated and disjointed legacy systems. Application modernization and consolidation initiatives are on the rise across all industries¹, and QA is playing a critical role in ensuring that this process goes smoothly. As part of their modernization strategy, companies are also looking at new technologies – such as cloud computing – to help cut the costs and increase the agility of their IT systems.

The cloud presents a real challenge to QA organizations, as it requires different approaches, skills, and tools than anything they have used in the past. However, QA is seen as absolutely essential to cloud computing, as organizations need validation that their cloud-based applications remain reliable, accessible, and secure.

FIGURE 1

HOW HAS THE PERCENTAGE OF BUDGET ALLOCATED FOR THE TESTING FUNCTION (INCLUDING TESTING PROCESSES, TOOLS, AND RESOURCE COSTS) CHANGED OVER THE LAST TWO YEARS?



¹ Capgemini *Application Landscape Report 2011 Edition* <http://www.capgemini.com/insights-and-resources/by-publication/application-landscape-report-2011-edition/>

37%

OF RESPONDENTS INDICATE THAT THEIR QUALITY RELATED BUDGETS HAVE ONLY INCREASED SLIGHTLY

The new trends and initiatives are clearly increasing the workload for QA teams. However, we are not seeing an exponential corresponding increase in QA budgets to support the added pressure. This year's survey shows that only 5% of companies have significantly amplified their QA budgets, and, surprisingly, 13% still don't have dedicated QA budgets at all. Just over a third of respondents (37%) indicate that their quality-related budgets have increased slightly, and an additional 35% suggest that they stayed the same (see Figure 1). This trend holds true for companies of all sizes, but varies by geography. While QA budgets remain relatively steady in North America and Western Europe, a significant increase is observed in China (83%) and Brazil (56%), suggesting that emerging economies view the investment in QA as strategic for future growth and competitive advantage.

Across sectors, Energy and Utilities, Healthcare and Life Sciences and Telecommunications verticals are among the leaders for increasing their QA budgets. The continued interest in application quality for telecoms providers can be explained by the fact that their core services have become a commodity, and consumers are free to switch providers if they are dissatisfied with any aspect of the service quality or reliability. The Telecommunications industry is also evolving

into an application-intensive sector that requires new software quality standards, methodologies, and skills. Healthcare companies, such as pharmaceuticals, have always been exceptionally sensitive to application quality, as their IT systems are strictly regulated, carry sensitive data, and support processes related to people's health and well-being. Mergers, consolidation, and acquisitions in the healthcare market are driving the demand for software QA. Energy companies are gearing up for a major transformation related to the adoption of smart meters, smart grids, and smart homes, and rely heavily on IT applications to support those initiatives.

Consumer Products, Retail, and Distribution (CPRD) and Public Sector organizations are lagging behind with their QA budgets. Nearly a quarter (23%) of respondents from the CPRD vertical state that their companies don't have a dedicated testing budget, with a further 13% suggesting that their QA budgets have decreased in recent years. The reason for this lies perhaps in low margins in the CPRD industry and the intense competition to get new products to market faster. Today's technology-savvy consumers expect easy online and mobile access to stores, and retailers rush to deliver this functionality often without spending the time to validate the new applications properly – often leading to embarrassing public failures. Public Sector is also seeing a decrease in QA funding (17%), with a further 18% of surveyed government organizations stating that they don't have a dedicated quality budget. We believe that this trend is going to reverse in the near future, as governments are faced with increased pressure from public stakeholders to improve the quality of their IT projects and not repeat the costly IT mistakes of the past.

Standardizing Quality Operations and Practices

Along with standardizing their application portfolios, companies are beginning to look at consolidating and globalizing their QA function. Although only 4% of survey respondents indicate that their companies have a fully operational Testing Center of Excellence (TCOE), an additional 6% say that they have started the effort of establishing a TCOE within the past two years. Furthermore, 46% state that they have plans to centralize their QA function using either in-house or outsourced expertise. Clearly this trend indicates a move towards a centralized and industrialized approach to testing around the globe (see Figure 2).

Naturally, the levels of interest and maturity of TCOEs differ according to company size. For example, less than a quarter of small company respondents suggest that they have plans to develop a TCOE – compared to an average of 74% for medium and large company respondents. The percentage drops again for enterprises of 10,000 employees and more. Just over half of IT managers working for the largest companies say that they plan to centralize their QA operations. Perhaps in this case, the sheer size of an organization can be a barrier to bringing quality processes and operations under one roof and standardizing on a similar set of metrics, tools, and procedures. Another

explanation of this finding is the fact that most enterprise-size companies have already tried various models – including both centralized and decentralized organizations – with varying success rates, curtailing new efforts.

Setting aside the smallest companies, the survey finds that emerging countries like Brazil (23%) and China (20%) are fast investing in building TCOEs. The survey results also indicate that countries such as New Zealand, Australia and Japan, with close proximity to China's booming economy, are increasing IT investment, hence the two-year plans to establish TCOEs in those countries. Even in countries not known to be traditionally strong IT centers, like Austria, Belgium, Italy, Poland, Portugal and Switzerland, we see TCOEs are either fully operational or are coming online shortly. Companies from the US and Canada are not far behind with 15% of respondents indicating that they have made investments in the TCOE (see Figure 3). The interest in the TCOE in North America is not surprising – mature companies with established QA organizations see centralized and standardized QA as a cost saving measure that can help improve the effectiveness of the QA team and its relationship with the business. The fact that emerging markets are investing in TCOE suggests that companies that are just developing their QA processes and infrastructures want to get it right from the start and avoid the mistakes that more established companies made in the past.

Across all verticals, High Tech companies with their mature quality practices are leading the centralization of QA with 17% of respondents suggesting that they have fully operational TCOEs. The other front-runner for TCOEs is the Manufacturing vertical (7%), which is not surprising considering that manufacturing has a long history of industrialized factory production, and fully recognizes the benefits of a centralized, consolidated approach to quality.

FIGURE 2

WHAT ARE YOUR COMPANY'S PLANS TO CREATE A STANDARDIZED/ INDUSTRIALIZED TESTING CENTER OF EXCELLENCE (TCOE)?

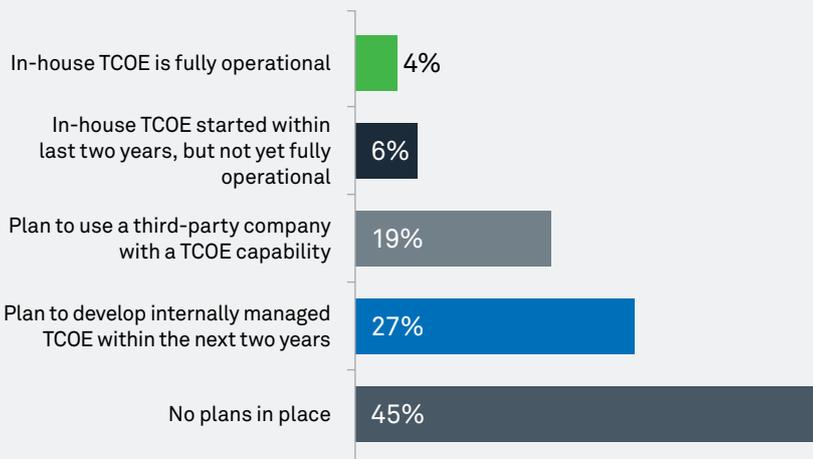
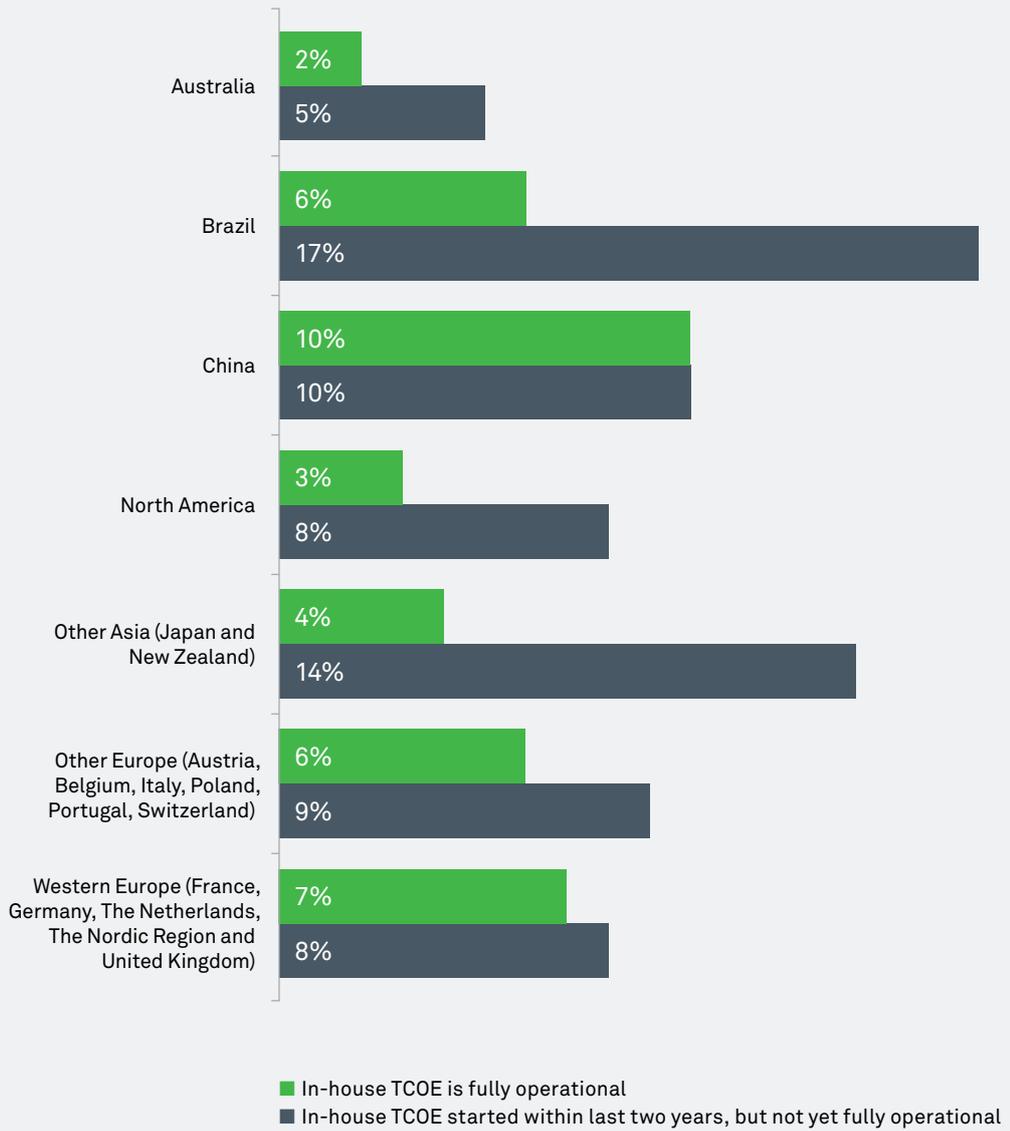


FIGURE 3

WHAT ARE YOUR COMPANY'S PLANS TO CREATE A STANDARDIZED/INDUSTRIALIZED TESTING CENTER OF EXCELLENCE (TCOE)?



Collecting and Sharing QA Metrics

A strong indicator of the maturity of quality processes in the organization is how effectively the QA team is collecting, documenting, and sharing QA metrics. Although the vast majority (80%) of respondents agree that they are consistently calculating and analyzing quality metrics, only a small percentage (7%) use specialized tools designed for managing the QA process. Most companies use Excel spreadsheets (53%) to aggregate and share QA metrics that they have collected using manual or automated tools, with an additional 24% preferring professional Business Intelligence (BI) solutions (see Figure 4).

The commitment to consistently gather and communicate QA data varies greatly by company size. Over a third (37%) of small company respondents admit that they don't regularly document and share quality data, compared to an average of only six percent for medium and large companies. The same trend is evident in the use of automated systems and BI solutions, where smaller companies favor mostly manual methods and tools (28%), and medium and large companies rely

more heavily on automated solutions (40%), and commercial BI tools (30%). Once again, the largest corporations (over 10,000 employees) are lagging slightly behind in processes and adoption of automated metrics methods. One in ten survey participants from the largest companies say that their organizations don't always measure and share QA results, and only 27% of respondents from this category say that they consistently use BI tools in their QA organizations. There are numerous reasons for this including the silo structures of QA teams and inconsistent corporate standards for metrics, units of measure, and taxonomy. From the industry perspective, Healthcare and Energy and Utilities are among the sector leaders in quality metrics. The Energy sector reports the highest percentage (94%) of companies who consistently collect and disseminate quality information and Healthcare is a clear leader among users of automated measurement solutions (49%).

Most of the surveyed companies (77%) agree that quality metrics are an effective tool for communicating the success of the QA organization to the rest of the company. When QA can align their metrics with the business goals and establish a clear correlation between application quality and the company's revenue, it is much easier to demonstrate to the business the tangible business value delivered by QA (see Figure 5).

FIGURE 4

HOW DO YOU COLLECT, SHARE AND PRESENT QA METRICS?

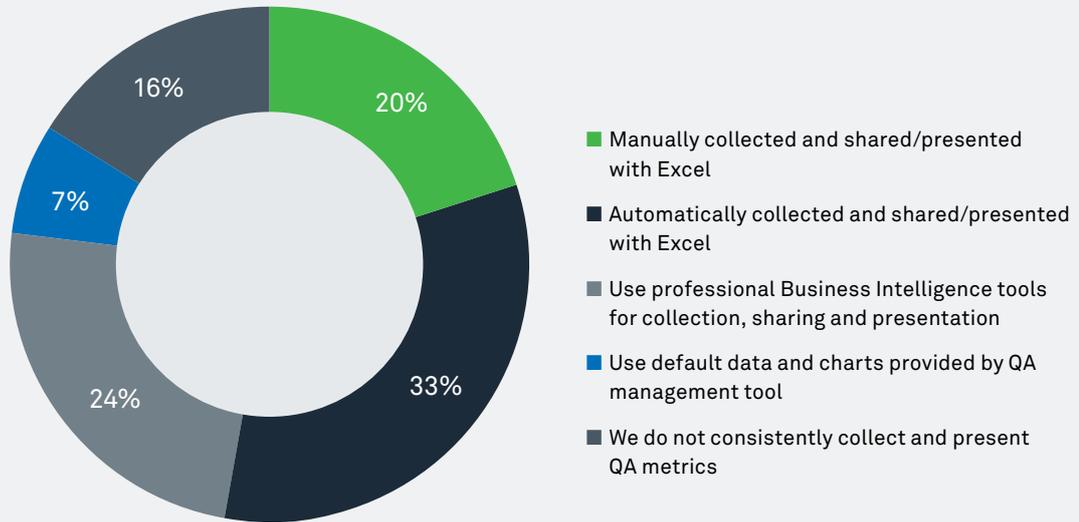
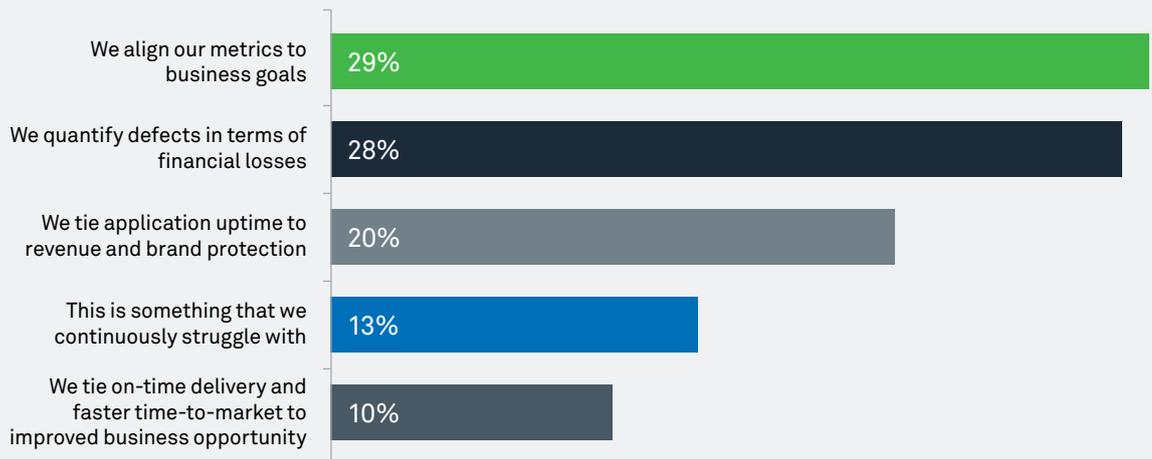


FIGURE 5

HOW DO YOU PROVE TO YOUR COMPANY THAT YOUR QA ORGANIZATION IS DELIVERING BUSINESS VALUE?



Technical Debt in Business Applications

By *Jitendra Subramanyam*,
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and Research, CAST Software

Quality means different things to different stakeholders and even different industries. In the High Tech industry, quality often means ease of use, whereas in Financial Services it is measured by precision and accuracy of computations. In last year's *World Quality Report*, we surveyed our audience, mainly QA professionals, regarding their perception of quality. A vast majority of the respondents shared an optimistic view regarding quality trends by conveying their belief that quality is on the rise. In fact, the majority of respondents (over 80%) had stated that the overall quality of applications was improving. This data is, of course, mostly qualitative and provides a single perspective on the industry. In order to bring a different and purely quantitative perspective around quality and costs, we partnered with CAST Research Labs who provided

us with their quality data based on real-life application and code analysis. The data they provided allows us to compare relative quality between industries and helps us to derive the actual direct cost of business disruptions caused by poor application quality. CAST has developed an Application Intelligence Platform that automates the measurements of quality through application code analysis. The metrics presented in this section are based on consistent, repeatable, automated measurements that do not involve any human input or surveys. The quality data presented in this section comes from 288 applications from 74 IT organizations (both Public and Private Sector) around the world. In total, 108.7 million lines of code were analyzed and measured to reveal the quality of applications worldwide.

CAST has built formulae to calculate what they call Total Quality Index (TQI) by measuring application quality as a

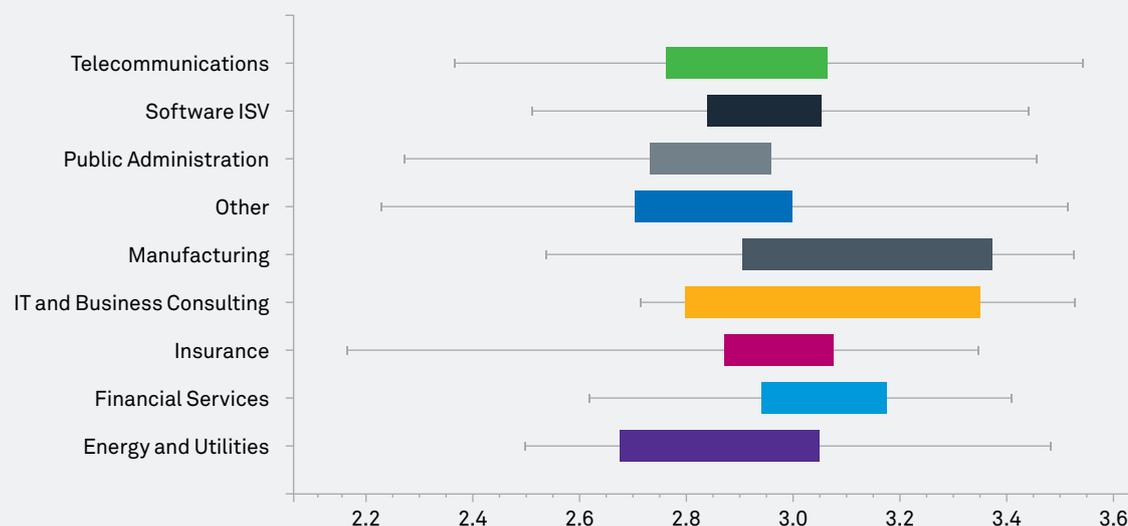
whole and deriving from a combination of the five health factors – Transferability, Changeability, Robustness, Performance, and Security. Each health factor is measured on a scale of 1 (very poor) to 4 (excellent). This approach looks at the best practices used during application development and measures the extent to which an application diverges from them. These deviations are categorized as violations. Not all violations count equally – some are more severe than others because their risk of business disruption is higher.

TQI Score

Based on the CAST data, we can break TQI scores across sectors into three groups. Energy and Utilities, Public Sector, and "Other" form the group with the lowest quality scores. The middle group with higher scores is made up of Independent Software Vendors (ISVs) and the Telecommunications sectors. The groups with the highest TQI scores include Manufacturing,

FIGURE 6

TQI SCORES BY INDUSTRY SECTOR



Financial Services, and IT and Business Consulting (High Tech). The reason for these differences certainly requires more study, but it seems to correlate strongly with the specific sector's overall quality maturity, the sector's perception of QA, the importance put on the QA function, and investments made relative to the overall IT spend (see Figure 6).

Technical Debt

Technical Debt is defined as the cost of fixing application quality problems that, if left unfixed, put the business at serious risk. Technical Debt includes only those application quality problems that are highly likely to cause business disruption; it does not include all problems, just the serious ones. Technical Debt is indirectly derived from the number of violations per thousands of lines of code (violations per KLOC) – the higher the level of business disruption, the

higher the severity of the violation. CAST Research Labs has a database of calculated violations per KLOC based on their automated application code analysis. Based on this data, we can compare, for example, the Technical Debt based on application technologies used (see Figure 7).

The Technical Debt estimates for newer technologies such as .NET and J2EE are much higher than the older technologies like COBOL. This is not surprising and it can be explained by the fact that the COBOL applications are largely “workhorse” applications from the Financial Services and Insurance sectors whose defects have been worked out by years of maintenance work.

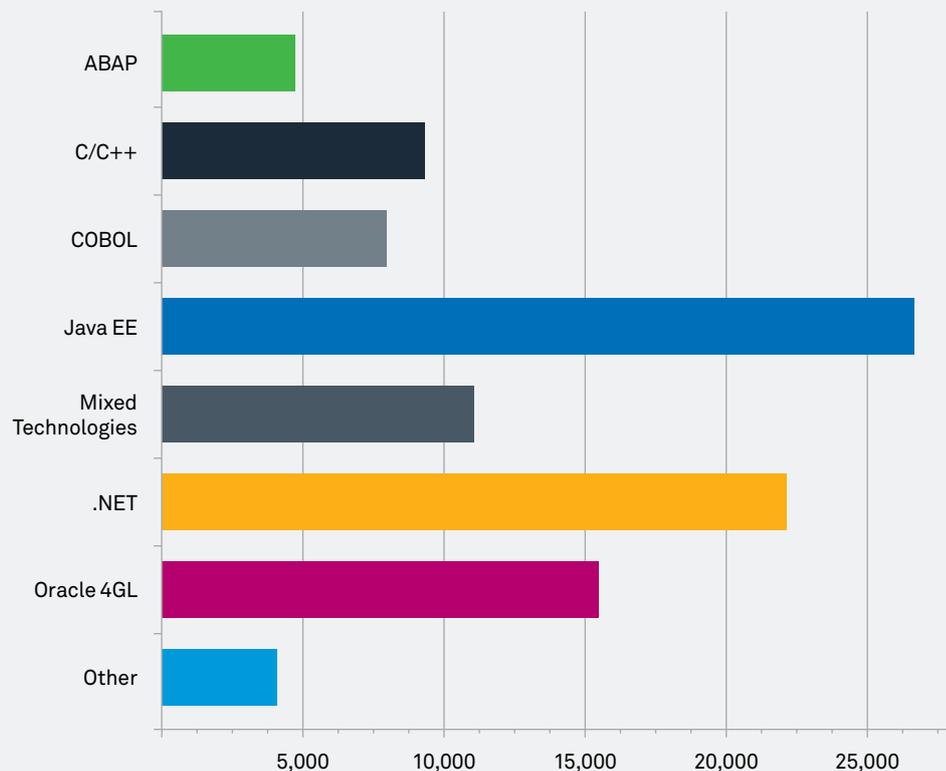
Due to the fact that the calculation of the Technical Debt is based on the number and severity of structural quality violations in an application,

and because these violations are demonstrably linked to business disruption, Technical Debt puts a monetary value on the business risk. This value can be very useful in making informed trade-offs between delivery speed, business risk, and maintenance/enhancement costs.

The calculation and tracking of TQI and Technical Debt are two new important metrics that should be included in measurement programs of IT organizations. QA teams too need to understand the impact and value that they provide to the business by measuring metrics such as Technical Debt. Monetary value is a metric that is well understood by the business and tracking it can help align QA closer to the business stakeholders. Total Quality Index is an important macro measure that provides benchmarking opportunities to individual companies for their corresponding sectors.

FIGURE 7

TECHNICAL DEBT IN DOLLARS PER KLOC BY TECHNOLOGY





TESTING TRENDS

Testing Effort Estimation, Tools, and Technology	20
Test Data Management	21
Test Automation	24

Testing Effort Estimation, Tools, and Technology

Despite both the public and private sectors' growing reliance on information technology, it appears that many QA organizations are still struggling to prove their value to the business. Even though QA teams are making an effort to tie their results to business goals and quantify the losses from production defects, there are no established standards for measuring QA success or estimating the amount of time and resources needed to sufficiently test an application. When asked about their practices in estimating the QA effort required for a project, only 22% of respondents say that they use industry standard estimation methods. The largest percentage of respondents (37%) indicate that they use internally developed estimation techniques, while an additional 29%

approximate the effort required for application validation based on past experiences or as a portion of the total development effort. The remaining 12% admit to doing as much testing as the time and budget allows, suggesting that they don't have any consistent methodologies for estimating upfront how much time and resources testing is going to require (see Figure 8).

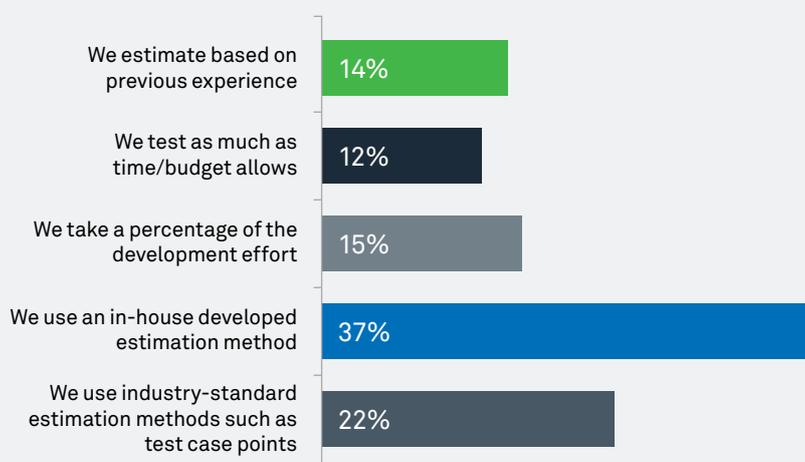
This lack of industrialized estimation methodology is problematic from several perspectives. First and foremost, a lack of consistent methodology in test effort estimation will undoubtedly lead to inaccuracies resulting in unmet objectives such as project delivery dates - one of the main reasons for contention between IT and business. Secondly, many projects are now adopting agile delivery

methods, with sprints producing executable files as short as two to three weeks. Inability to estimate the testing effort in short bursts leaves very little room for error. Though using internally developed estimation techniques is better than not using any at all, without proper documentation, research and repeated training, these approaches can become stale and eventually disappear from corporate consciousness. When possible, companies should adopt industrial techniques that benefit from wide research and resource pools available in the industry. Business puts an ever-increasing emphasis on the on-time and on-budget delivery of high quality applications. Accurate estimation of testing efforts is an art that requires mastering from all QA teams.

There may be a correlation between the lack of accurate estimation techniques and QA budgets. For example, our survey shows that 16% of organizations in the Public Sector simply perform as much QA as the project time would allow. Perhaps not so coincidentally, 18% of respondents from the same sector suggest that their organizations don't have a formal QA budget. A similar correlation is observed in the CPRD sector, with 12% of respondents implying that there are no formal QA estimation methods in their companies, and 23% suggesting that they don't allocate dedicated budgets to QA. Perhaps when QA is unable to provide business with guidance on the time and resources required for their effort, companies are less willing to commit funds to the QA activity.

FIGURE 8

HOW DO YOU ESTIMATE THE QA EFFORT REQUIRED FOR A PROJECT?



Test Data Management

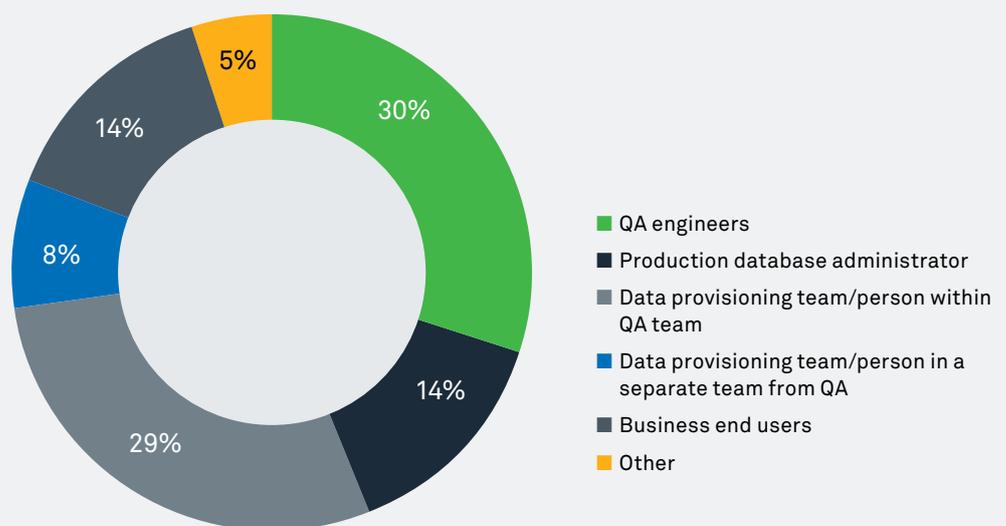
To accurately predict application behavior in production, testers need to validate its functionality using multiple sets of data. The data could be customer names, shipping addresses, credit card numbers, inventory part numbers – or any other records that would be moving through the system when it is in production. Having large quantities of accurate data available for testing helps ensure that the application has been verified with different data permutations and is prepared to handle different situations when it goes live. In most companies, provisioning of test data is the responsibility of QA – QA engineers (30%) or a dedicated team (29%) (see Figure 9). The CPRD industry stands out as it relies on the business analysts for test data more than twice as much as other verticals, which can be explained by the fact that many of

the retailers and other CPRD companies don't have dedicated QA budgets and typically involve other internal departments in QA-related tasks.

Only 11% of the surveyed companies across all sectors are using production data for testing purposes. Among the medium and large companies, the usage of production data is increasing in parallel with company size – the larger the company, the greater the use of production data. This trend can be explained by the increased need for testing accuracy. The need for precision can also help clarify the high percentage of survey respondents from the Financial Services sector (16%) who claim to be using production data for testing. By exercising the system with the real-world data, there's greater assurance that it will

FIGURE 9

WHO IS THE PERSON RESPONSIBLE FOR PROVISIONING TEST DATA IN YOUR SITE?

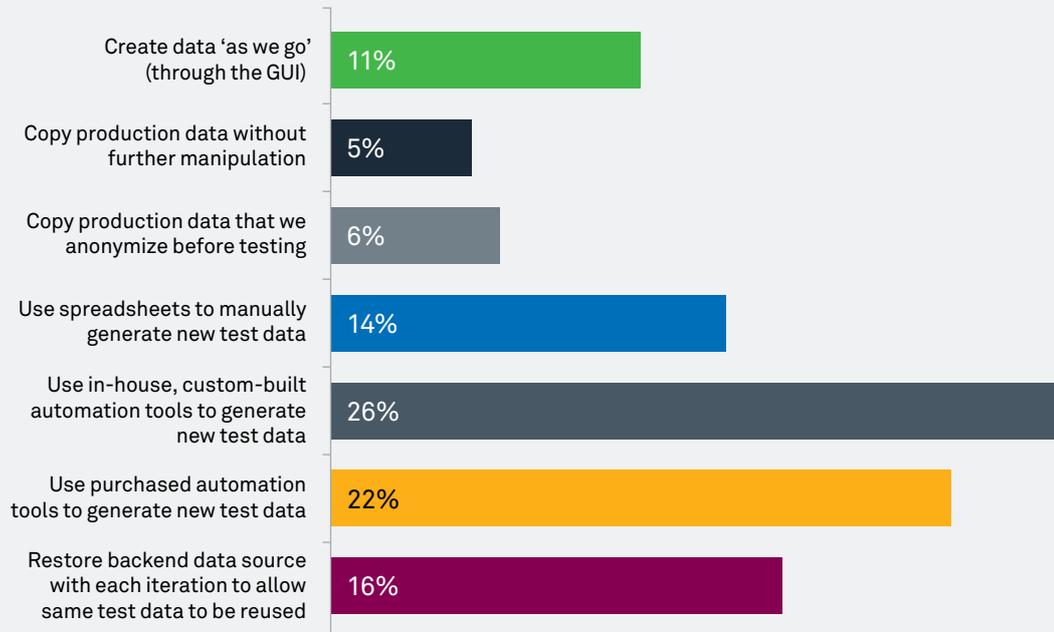


not run into unexpected problems in production. The smallest companies with up to 500 employees also tend to use production data for testing, but in this case, it is more likely due to the fact that it is more cost-effective to extract testing data from production systems than generate it manually or by using automated solutions. Most companies, however, prefer to generate new data for testing using either internally-developed automated tools (26%) or a commercial solution for creating test data (22%). Less popular options include restoring back-end data source (16%), using spreadsheets to manually generate data (14%), and the arduous task of creating test data on the fly (11%) through the Graphical User Interface (GUI) (see Figure 10).

In the majority of cases, when QA teams manually prepare test data or handle large amounts of data, they risk inserting human error into the process. Without a structured, automated test data management (TDM) software solution, repeated data sub-setting for multiple test iterations can quickly become unmanageable. A number of commercial TDM solutions are now available to help standardize the process of managing test data from multiple sources. These tools are offered through both on-premise and Software as a Service (SaaS) delivery options. Nearly half (44%) of surveyed IT professionals prefer their TDM system to be deployed onsite and fully managed internally. An additional 29% favor an onsite deployment, but with

FIGURE 10

HOW DO YOU GENERATE TEST DATA FOR MULTIPLE ITERATIONS OF TESTING?



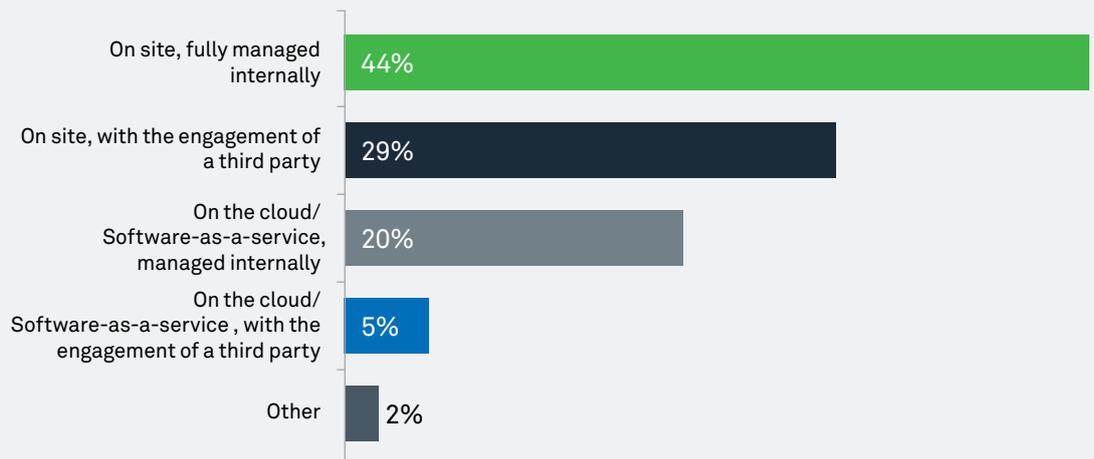
the involvement of the third-party vendor. One in five (20%) concur that their preferred method would be to use SaaS-based TDM systems, and an even smaller number (5%) would agree to trust their sensitive test data to a SaaS TDM system under third-party management. This suggests that companies are very sensitive to how they handle their test data, and want to ensure its security by either keeping it onsite or managing it in-house without involving a third-party vendor (see Figure 11).

CPRD, Healthcare, Public Sector, and High Tech are among the verticals with the strongest preference for onsite, internally-managed TDM. Healthcare companies, in general, are reluctant to use the cloud due to strict privacy

laws. The Public Sector's involvement with the cloud has historically been low, although we are seeing a push from government IT leadership in many countries towards adoption of cloud technologies, so perhaps their attitude toward SaaS-based TDM solutions will change. Retailers are among the slowest overall adopters of cloud technology, and High Tech companies are the most conscious when it comes to data security when using cloud-based applications. Using automated data sub-setting and masking, TDM allows companies to accelerate test data preparation. In our survey, most companies believe that a TDM solution is going to help them improve the accuracy of test data (53%), followed by cost reduction (22%), and time savings (22%) in provisioning the test data.

FIGURE 11

WHAT IS YOUR PREFERRED METHOD FOR DEPLOYING A TEST DATA MANAGEMENT (TDM) SOLUTION?



Test Automation

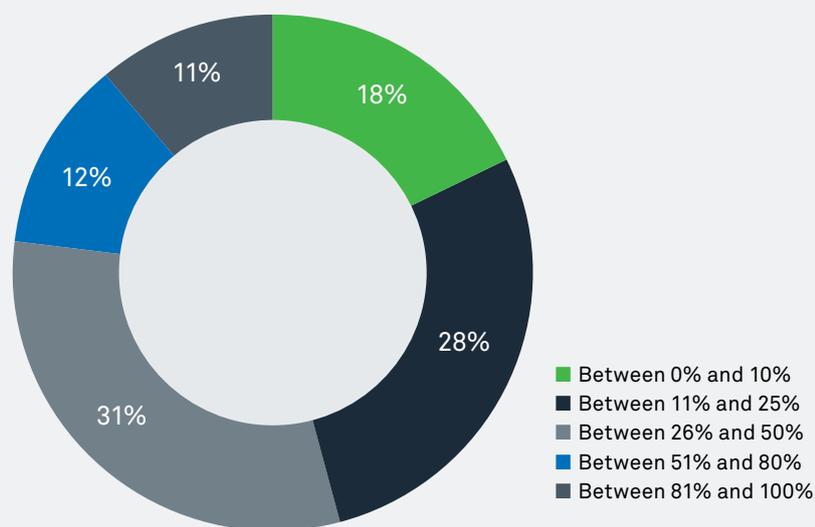
For the third consecutive year we've observed the rise in the use of test automation technologies, however manual testing is still often the preferred method for application verification. The survey finds that 18% of companies run up to 10% of their tests manually. The majority (59%) conduct between 11% and 50% of their tests without using automation, and only 23% use automated solutions for over half of their tests (see Figure 12). Our experience suggests that the actual figures for automation adoption may be even lower than the survey shows. It is not uncommon for QA teams to refer to manual tests that are stored in a central repository

as "automated," making the total automation levels appear higher than they actually are.

Naturally, it is not practical to automate the testing process for all types of applications. There will always be IT systems that require at least some portion of tests to be conducted manually. In certain situations – such as early validation during a sprint – it is significantly faster and more cost-effective to run a manual test than to invest in creating an automated script. Test automation companies are introducing tools that now enable QA teams to run "headless tests" – without a need for the user interface

FIGURE 12

WHAT PERCENTAGE OF YOUR TEST EXECUTION IS CONDUCTED MANUALLY?



25%

OF SMALL COMPANY
RESPONDENTS INDICATE
THAT THEIR QA TEAMS RUN
BETWEEN 81% AND 100%
OF TESTS MANUALLY

or the completed application. In agile development environments, stubs are leveraged to create an end-to-end application environment before the full development is finalized. QA teams can create automated scripts and stubs to simulate an application environment for testing. This in return introduces testing in the early stages of the application development lifecycle, thus reducing defect leakage.

However, many companies still have a long way to go when it comes to adopting test automation. Not surprisingly, the degree of test automation varies by company size and geography. For example, 25% of small company respondents indicate that their QA teams run between 81% and 100% of tests manually. Compared to the average of 5% among medium and large enterprises, this is a significant amount. If we set aside the smallest companies, North America appears to be lagging behind in test automation, with an average of 28% of American and Canadian respondents suggesting that more than half of their tests are being run manually. In comparison, only 14% of Western Europe survey participants say that most tests are executed manually. China is in the

forefront of automation use with only 6% of respondents suggesting that more than half of all tests are being run manually. This can be explained by the fact that developing countries often have the ability to leapfrog ahead of the developed world and use the latest technology available.

Despite these numbers, we observe an increase in the use of test automation. Business pressures for faster time-to-market and reduced costs can explain part of this trend. The rest of the picture is formed by the efforts of testing software vendors to develop increasingly easy-to-use automation tools that require minimum scripting and development effort. A simple comparison of today's performance testing tools with those of 10 years ago would demonstrate the degree of automation that has been introduced to the scripting phase of testing. Many of the tasks such as data permutations, synchronizations, or the creation of arrays can now be managed from a GUI rather than the more complicated script views of the past. The increased ease of use of these tools no doubt plays a large role in the increased adoption and usage of automated testing tools.



THE FUTURE OF OUTSOURCING

Outsourcing Plays Key Role in Quality Management	28
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Activities Assigned to Outsourcers	30

Outsourcing Plays Key Role in Quality Management

Outsourcing as a trend has its roots in the Manufacturing industry in the late 1970s, with major manufacturers aiming to cut costs, but it soon gathered steam when component parts suppliers followed suit. It remained a manufacturing phenomenon until the late 1990s, when it spread to the IT industry, following the expansion of fiber optic networks around the globe. This is the third year of tracking outsourcing in testing activities, and it is clear that outsourcing continues to play a key role in quality management and, by all indications, this trend will continue over the next few years. More companies are choosing to focus on their core business and outsource functions such as QA to third-party

vendors. Over two thirds (69%) of survey respondents say that their companies employ the services of contractors or third-party vendors for QA. This number is heavily skewed by small companies, and if we set aside corporations with fewer than 500 employees, the percentage of businesses relying for some portion of their QA activities on outsourcers increases to 86%.

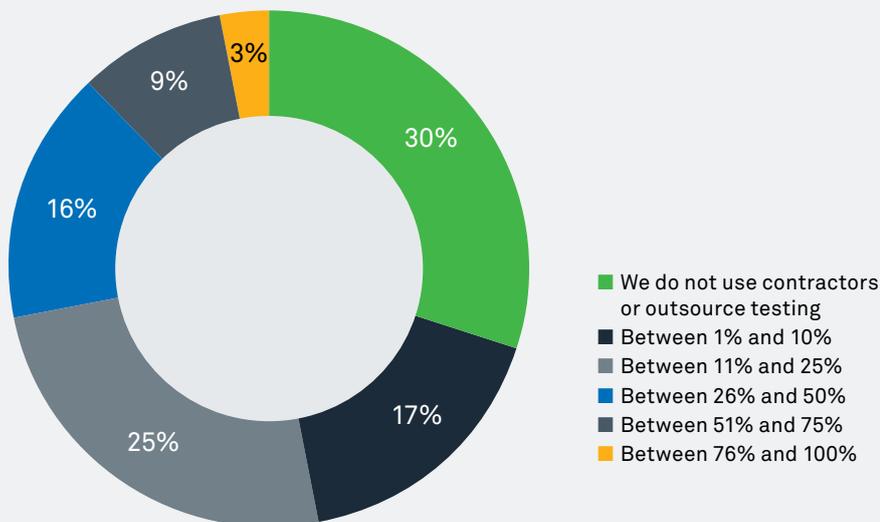
Most companies involved in the outsourcing of testing initially do so due to favorable labor costs in offshore locations. However, other reasons include the ability to sidestep more stringent workplace and environment regulations, an educated workforce offering higher technology skill sets,

and foreign government subsidies. The combination of all these factors has turned the outsourcing of testing from labor arbitrage to a more balanced and value-based proposition.

Of those companies that outsource their application quality work, the overwhelming majority (89%) suggest that less than half of their QA testers are contractors or are employed by a third-party service provider. Only 16% of respondents indicate that they rely heavily on outsourcers, and more than 51% of their testers are not internal employees. Larger companies tend to rely more on outsourcers, although, even among the largest enterprises with over 10,000 employees, only 12% have more than half of their QA staff working for an outsourced provider. This suggests that, although QA outsourcing continues to grow, most companies still maintain internal QA teams and prefer to keep at least a portion of the quality function and expertise within the organization (see Figure 13).

FIGURE 13

WHAT PERCENTAGE OF TESTERS AT YOUR COMPANY ARE CONTRACTORS AND/OR ARE OUTSOURCED TO A THIRD-PARTY VENDOR?



Locations for Outsourced QA Services

Companies prefer to outsource in markets with a high degree of growth. Between the years 1995 and 2008, US Gross Domestic Product (GDP) grew at a rate of 2.9%, whereas China grew by 9.6% and India by 6.9%. Furthermore, today 500 of the largest US companies generate 47% of their revenues outside the United States. It is no surprise that China and India represent the fastest-growing markets for outsourcing of testing.

Although 37% of surveyed companies globally say that all of their resources, including contractors and third-party vendors, are located within their office facilities, most have a number of testing staff working at a nearshore or offshore facility. The number of testers who are not co-located

within the company's main offices increases in line with company size. Larger companies seem to be more comfortable with the concept of having their QA resources located away from their office facilities (see Figure 14).

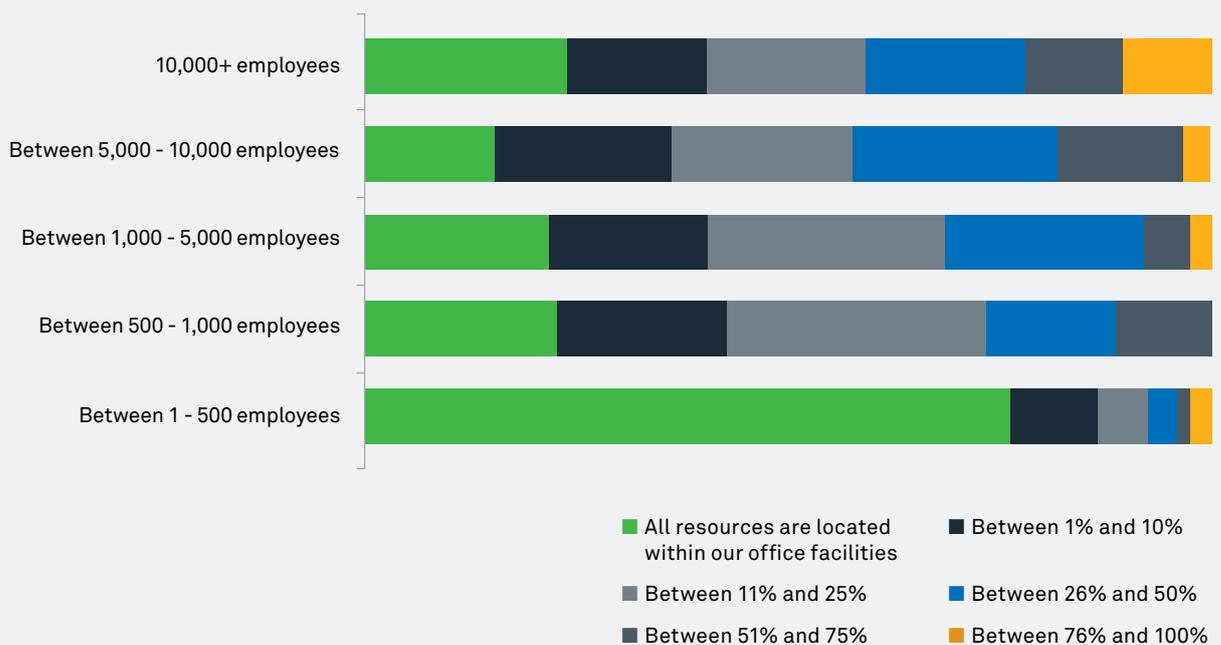
The preferred way of outsourcing continues to be co-location (27%), followed by nearshore locations within the company's country or continent (24%). For US and Canada-based companies, the next choice is often India (18%), followed by China (12%) and Eastern Europe (9%). The same locations are popular among European companies who venture beyond co-location and nearshore, although the outsourced destinations are in a different order: 12% of Western European companies prefer to

outsource to their Eastern European partners, followed by 7% to China and 4% to India.

Traditionally, India has been the number one choice of outsourced QA services due to the available number of skilled resources and their proficiency with the English language. In recent years, however, China has emerged as a serious contender for the position of the leading outsourced QA services provider. For example, China is the first choice of companies in the Manufacturing sector. It is a natural extension of this relationship that American and European businesses are looking at China to provide IT and specifically QA services as well.

FIGURE 14

WHAT PERCENTAGE OF TESTERS AT YOUR COMPANY ARE WORKING AT A NEARSHORE OR OFFSHORE LOCATION OUTSIDE OF YOUR COMPANY'S MAIN OFFICES?



Activities Assigned to Outsourcers

At the beginning of the outsourcing movement, companies were seeking cheaper resources to augment their internal capabilities at lower costs. With rates at overseas outsourcing centers rising, companies in North America and Europe are re-evaluating both the skill sets that are required of outsourcing providers and their activities.

Companies are increasingly looking for contractors and third-party service providers to possess technical and industry-specific knowledge, solid understanding of QA best practices and methodologies, and proficiency with QA tools and metrics. Furthermore, they are no longer looking to outsource only test preparation and execution. Today's providers must offer a complete suite of services – including testing strategy, requirements definition, functional and performance testing, user acceptance testing, and security testing (see Figure 15).

India has traditionally worked with US-based companies and specialized in providing testing services to the FS sector. At the end of the recent financial crisis, US-based financial companies were negatively affected and significantly downsized their IT spend. In the near future, these companies may not fully recover and reach pre-crisis IT spend levels.

To offset the possible effects of these changes, India-based firms are investing heavily in setting up offices across Europe to lure a diverse mix of companies from different regions and sectors outside their traditional domains. In the meantime, China has achieved dramatic growth and gained significant market share. We are probably witnessing the rise of China as a major player in the testing outsourcing market and, increasingly, we will see a two-way race for dominance between India and China.

23%

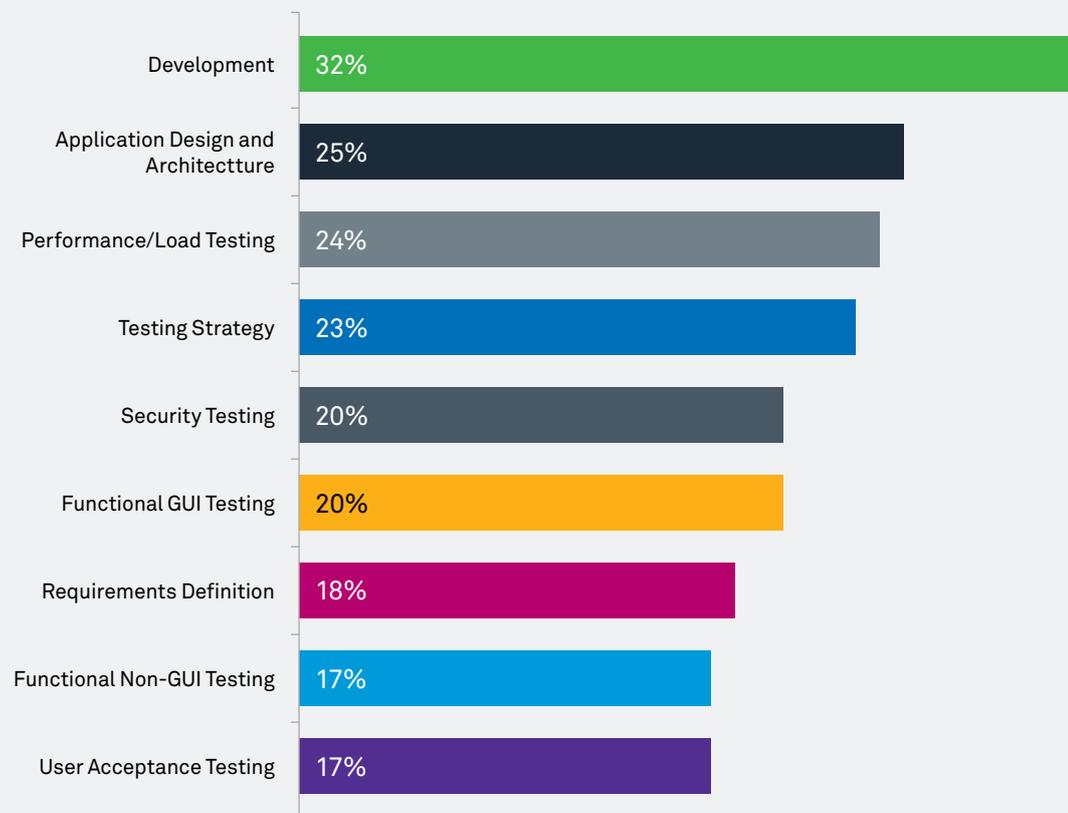
OF RESPONDENTS INDICATE THAT THEY OUTSOURCE TESTING STRATEGY

20%

OF RESPONDENTS INDICATE THAT THEY OUTSOURCE SECURITY TESTING

FIGURE 15

WHAT TYPE OF ACTIVITIES DO YOU ASSIGN TO CONTRACTED AND/OR OUTSOURCED RESOURCES (SELECT ALL THAT APPLY)?





THE CLOUD EMERGES

Using the Cloud to Reduce IT Costs and Increase Agility **34**

By **Erik van Ommeren**, Director of Innovation and Vision
Inspiration Navigation Trends, Sogeti and **Matt Morgan**,
Worldwide Product Marketing, HP Software Applications

Using the Cloud to Reduce IT Costs and Increase Agility

In the media, we often see discussions about the “cloud revolution.” True, the model of deploying and consuming IT services on the cloud infrastructure is gaining traction, but it is more of an evolutionary change, with an increasing number of services, technologies, and components becoming available to enable companies to make their IT systems more flexible, agile, and cost-efficient. Compared to last year’s survey, the percentage of companies that are moving at least some portion of their IT systems to the cloud has grown by 5%.

The “cloud” as we know it today was made possible by the advancements of the Service-Oriented Architecture (SOA), maturity of automation and virtualization technologies, and the growing demand for self-provisioning

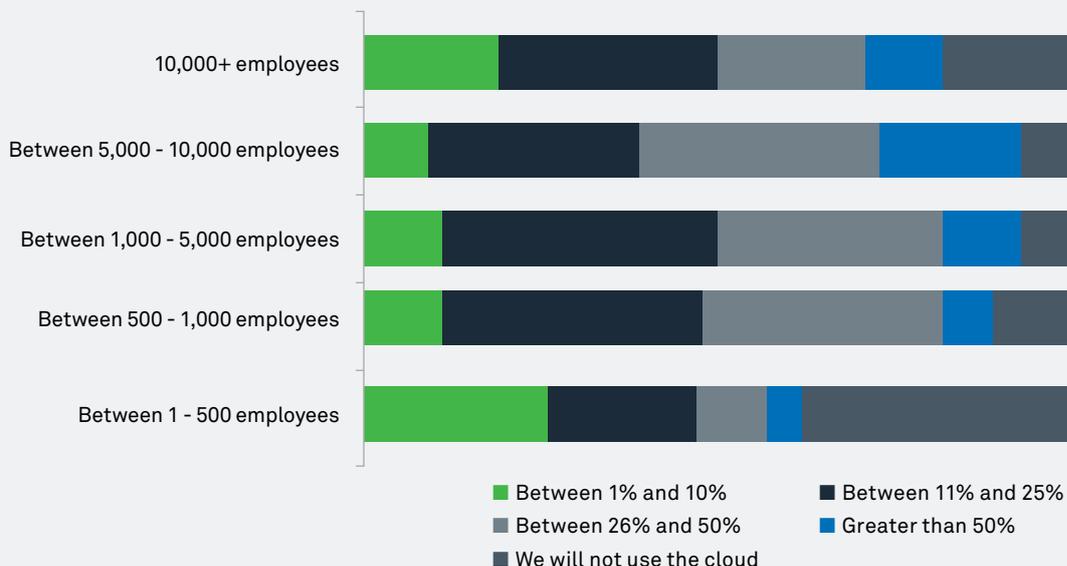
of IT services. But perhaps the most important factor that elevated cloud computing to the top of many CIOs’ agendas is the need to modernize IT infrastructure and services, reduce complexity, cut costs, and respond rapidly to changing business needs. The economic decline of recent years has had a positive impact on the proliferation of the cloud concept. When faced with budget cuts and increased demand for business agility, many IT teams were forced to take an inventory of their assets and determine what portion of their resources could be freed up by reducing the amount of hardware and infrastructure to be managed. For IT departments, the cloud is an opportunity to cut costs by reducing the number of under-utilized servers and other components.

Virtualization, standardization, and easy scalability are the noticeable benefits that attract IT decision-makers to cloud computing. However, the business side is also beginning to recognize the cloud potential. SaaS applications attract business users with the promise of easy deployment, faster ramp-up, and lower start-up costs. If the business sees an application that fits its needs, it can sign up and begin using the application almost instantly in the cloud environment. Most companies have some form of self-provisioned cloud applications running in their lines of business – from small file-sharing or video-hosting applications, to full-featured Customer Relationship Management (CRM) systems or complex platforms for executing marketing campaigns and generating sales leads. The ultimate benefit for the business is increased agility in finding, deploying, and adopting new lower-cost services.

The cloud is attracting organizations of all types and sizes (see Figure 16). Large organizations often have the resources to invest in setting up a private cloud as part of their IT modernization initiative, while smaller companies use the public

FIGURE 16

WHAT PERCENTAGE OF YOUR APPLICATIONS DO YOU EXPECT WILL BE HOSTED OR MIGRATED TO THE CLOUD OVER THE NEXT YEAR?



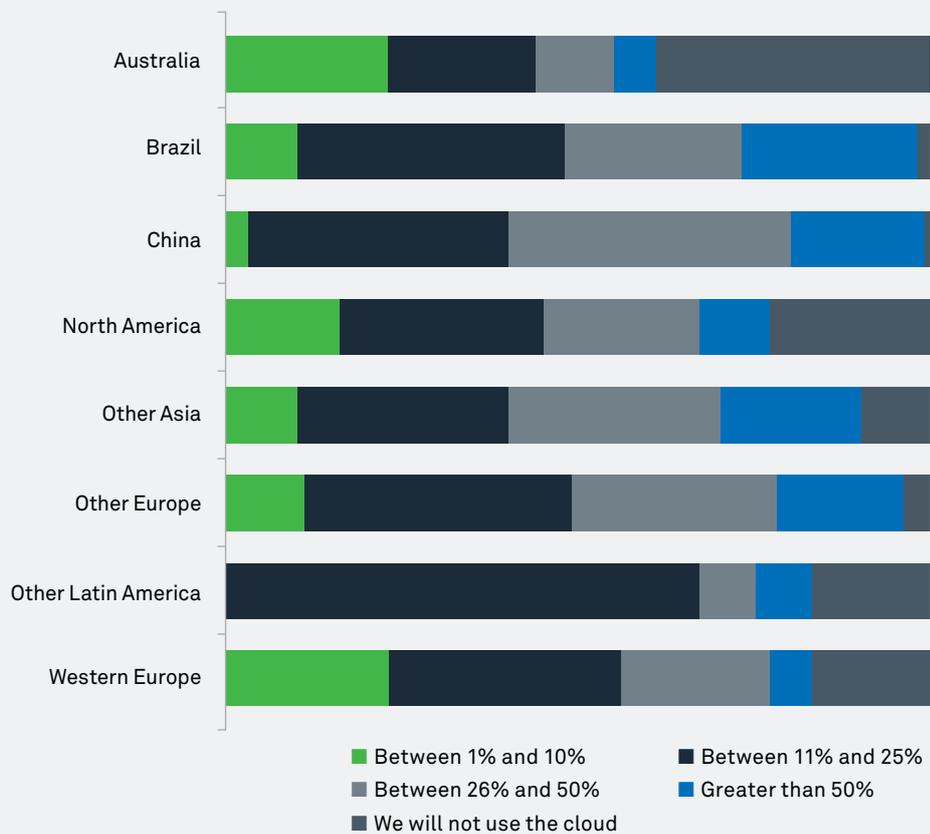
cloud infrastructure and services to gain a competitive edge, sidestepping the need to build large data centers and host and maintain their own IT systems. Most startup companies today don't invest in IT infrastructure – they simply take advantage of what is available through the cloud; bringing their ideas and products to market faster than many of their larger competitors.

This statement also holds true for today's emerging economies, despite the fact that certain country-specific regulations can prevent companies from freely using Internet-based services. Countries that don't possess an extensive IT infrastructure are choosing the cloud over building expensive datacenters, self-provisioning and pay-per-use over large-scale, multi-year IT projects, and agility over complexity.

In our survey, 24% of companies in North America and an average of 18% of respondents from Western Europe indicate that they still have no interest in migrating their applications to the cloud. In contrast, only 1% of Chinese companies and 2% of companies in Brazil chose not to invest in the cloud. In fact, their plans to use the cloud are among the most aggressive in the world. Responses from the Chinese companies show that 37% of companies are arranging to migrate between 11% and 25% of their applications to the cloud in the next year, and a further 40% of IT organizations are making arrangements to host between 26% and 50% of their systems on the cloud (see Figure 17).

FIGURE 17

WHAT PERCENTAGE OF YOUR APPLICATIONS DO YOU EXPECT WILL BE HOSTED OR MIGRATED TO THE CLOUD OVER THE NEXT YEAR?



This growing popularity of the cloud is not going to make internal IT departments obsolete. However it is likely to increase competition between external providers and internal IT organizations. The business is going to compare the cost, quality, and speed of creating a system for their specific projects, putting more pressure on corporate IT to optimize, automate, and become even more efficient.

The cloud also presents another quandary for internal IT – escalating loss of control over applications that are being used throughout the organization. When PCs were first introduced in the business environment, IT responded by setting up policies for software downloads, application hosting, and even access to specific web sites. The goal was to protect the company's IT

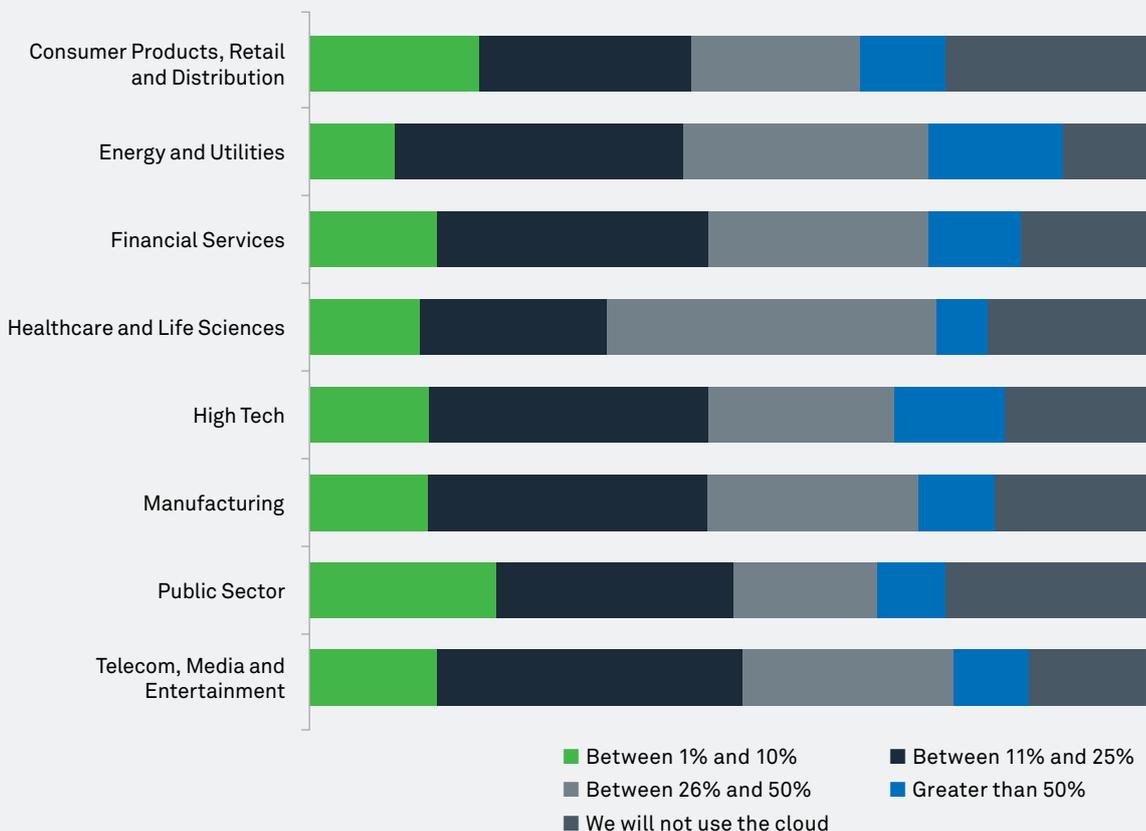
systems from accidentally downloaded malware, sudden increases in traffic, or sensitive data leaking out when employees left the company. For years, corporate IT successfully managed the workers' PCs, and employees generally followed the rules designed to protect their company's IT operations. However, the introduction of cloud-based services has once again changed that carefully crafted equilibrium. SaaS-based services can be enabled in a matter of minutes. But what happens when the current project owners leave or the company gets restructured? Who has control of the data that is stored on the cloud? Who is responsible for integrating the data from the cloud-based service with the rest of the company's IT systems? To avoid costly mistakes, IT managers need to begin looking at these questions now and start putting

in place the right processes to bring harmony into the emerging world of the cloud. The cloud is an opportunity rather than a threat, but it needs to be properly managed and integrated to fully realize its potential.

It is no surprise that some companies are not embracing the concept of the cloud. CPRD, Public Sector, Healthcare and Life Sciences and Manufacturing verticals are the most reluctant, with a higher percentage saying they will not use the cloud (see Figure 18). Not unexpectedly, when asked about the risks associated with using the cloud, 55% of respondents point toward security concerns (see Figure 19). In reality, with the cloud, it is very difficult to differentiate between real and perceived security issues. Clearly, many companies feel uncomfortable relinquishing

FIGURE 18

WHAT PERCENTAGE OF YOUR APPLICATIONS DO YOU EXPECT WILL BE HOSTED OR MIGRATED TO THE CLOUD OVER THE NEXT YEAR?



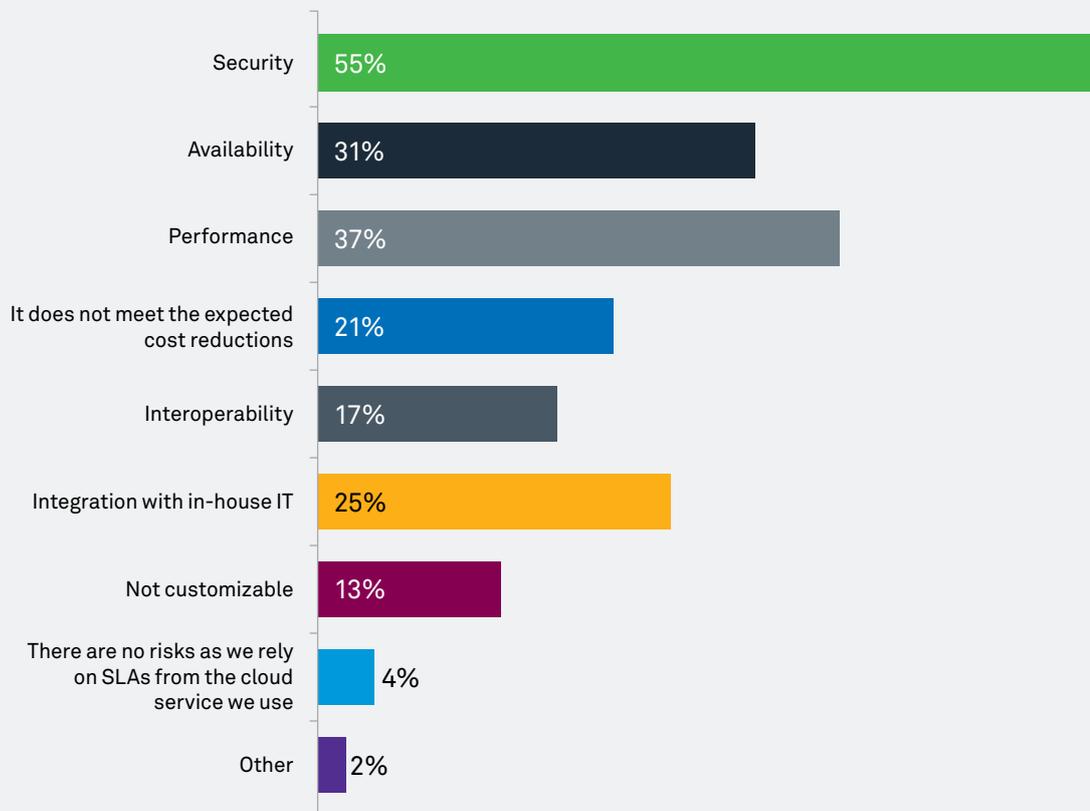
control of where their data is stored and how it is managed. Some organizations have specific requirements – such as having their data stored on a dedicated database for instance, citing potential vulnerabilities related to a multi-tenant model. Other organizations – specifically in the Healthcare industry – must comply with regulations that explicitly prescribe where the data must be stored in the world. Without a doubt, these policies were put in place before IT was faced with the global realities of cloud computing, but it doesn't change the fact that organizations must comply with current country and industry laws.

The truth is that some organizations will find that the cloud doesn't apply to everything, and in some cases

– anything that they do. But most companies will find the way to resolve any trust issues that may arise between them and their cloud service providers, and will find ways to fit the cloud into their IT frameworks. Often, simply having a Service Level Agreement (SLA) from a reputable provider is sufficient. Service providers view data security and service availability as their main assets. Their entire business model depends on having solid strategies and policies in place to protect their customers' data and ensure systems performance and scalability. In fact, those policies are typically better than the ones used internally by corporate IT, so the general perception that external providers are somehow less secure than internally hosted applications is often unsubstantiated.

FIGURE 19

WHAT ARE THE GREATEST RISKS FOR USING A CLOUD ENVIRONMENT (SELECT ALL THAT APPLY)?



25%

OF RESPONDENTS INDICATE USING SOFTWARE-AS-A-SERVICE MODEL LICENSES FOR REQUIREMENTS MANAGEMENT

The cloud also has a great impact on the world of quality and testing – both for testing on the cloud and testing of the cloud itself. Using the cloud while testing, offers obvious benefits – instead of installing many servers for load and performance testing, testers can use the elastic cloud to generate load on their applications. Similarly, the cloud can be used as a separate test environment or as a pay-per-use model for testing software applications. When asked about the percentage of their QA software licenses consumed through SaaS, a quarter of all respondents say that between 11% and 25% of their licenses are based on usage, with a further 21% stating that up to half of their QA software is delivered via SaaS. (see Figure 20). The majority of these licenses are used for functional (49%) and performance (48%) testing (see Figure 21).

A much more complicated use case is the testing of cloud-based applications and infrastructures. If an organization's IT portfolio contains a mixture of cloud-based and internally-hosted applications, maintaining the quality of the portfolio becomes a combination of traditional QA verification and the management of contractual terms and SLAs. A QA manager, with a portfolio containing a cloud-based CRM system, for example, cannot afford to test it in a vacuum without understanding how the provider's security, performance, availability, and backup procedures might affect the entire end-to-end business process.

Testing the complete end-to-end business process – as opposed to simply validating the standalone application functionality – had become the focus of QA even before the proliferation of the cloud. With the emergence of composite applications and SOA, it became essential to validate not just the lowest level of application functionality, but to ensure that all the layers of complex applications were working in harmony.

Testing composite applications is a three-pronged approach. It still has the traditional user-experience testing element, but it also adds a service-level testing component below that, and end-to-end business process testing above it. This approach allows testers to validate the application infrastructure in the shared model, as well as exercise the end-to-end processes that touch multiple applications. Shared services that are stored in the cloud typically don't have interfaces on them; that requires an entirely different approach to testing and test automation. Additionally, all of these components may not be ready at the same time, requiring testers to virtualize the downstream components to be able to run the complete end-to-end system verification.

Cloud is perhaps the biggest game changer in the art of testing, requiring a different skill set and a different portfolio of automation tools to successfully validate the functionality and performance of complex applications that are running on a shared infrastructure. Testing in the cloud is more about managing the entire IT portfolio of services, rather than verifying the quality of individual systems.

FIGURE 20

WHAT PERCENTAGE OF YOUR COMPANY QA/TESTING SOFTWARE LICENSES USE THE SOFTWARE-AS-A-SERVICE MODEL WHERE YOU ARE PAYING BASED ON USAGE?

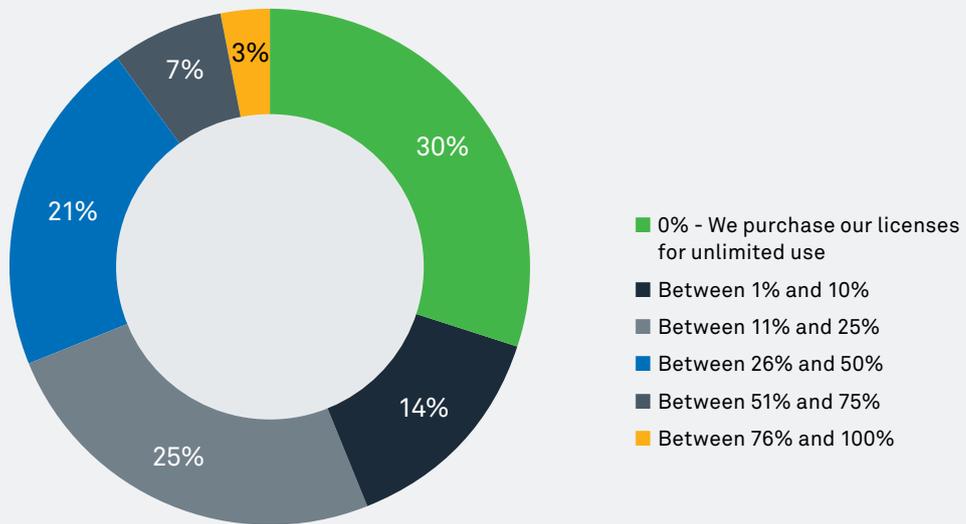
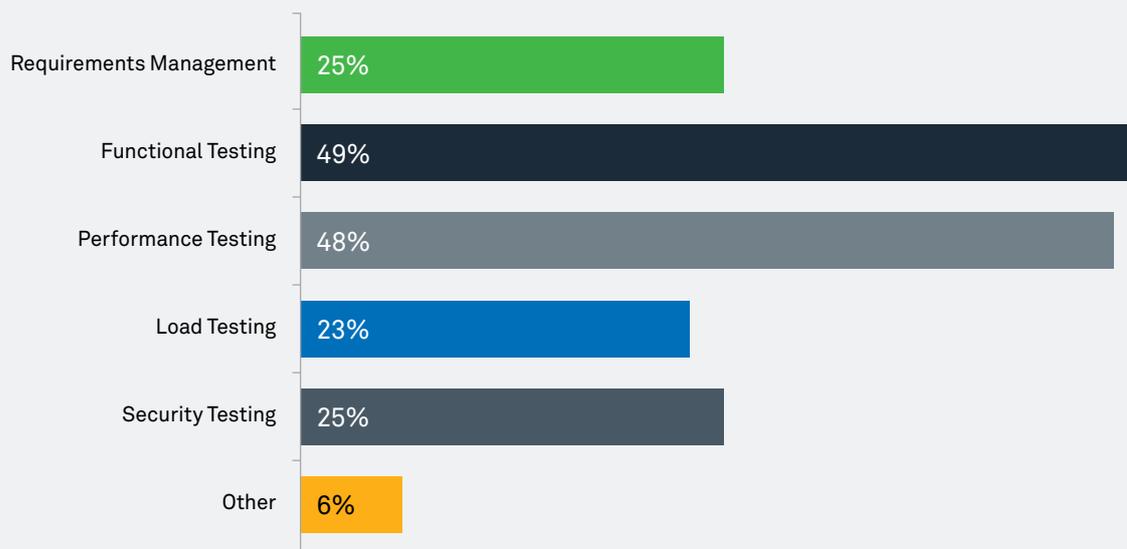


FIGURE 21

IN WHAT AREAS OF THE QA FUNCTION ARE YOU USING THE SOFTWARE-AS-A-SERVICE MODEL (SELECT ALL THAT APPLY)?





SECURITY TESTING

Application Security – Building Right from the Start

42

By **Carlo Klerk**, Application Security Consultant, Sogeti
and **Jason Schmitt**, Sr. Product Marketing Manager,
Application Security, HP

Application Security – Building Right from the Start

The emergence of new technologies such as cloud computing, and the growing reliance on Internet-based applications are fueling the growing imperative of security testing.

Security testing has long existed as a separate testing discipline, but until now it has been restricted to select specialists within an organization or to expert security testing provider companies. Unlike functional or performance testing, security testing doesn't have specific requirements that the tester needs to verify. With security testing, it is not always easy to quantify what must be validated. Quite the opposite – the purpose of security testing is to make sure that the system doesn't exhibit behaviors that can be potentially harmful or malicious. The ultimate goal of security testing is to verify that confidential and sensitive information is protected from being accessed or damaged by unauthorized users. It is also helping to ensure that the system's accessibility is not compromised and it is available for legitimate use.

Application security is typically viewed as an audit and risk management function, and different companies place this responsibility with different organizations. Our survey shows that, most commonly, security is the domain of the Information Security group (27%), followed by QA (26%), Operations (20%), and Engineering (13%), although this distribution varies widely by geography, industry, and company size (see Figure 22). The larger the company, the greater the percentage of respondents who say that they have a dedicated Information Security team – a specialized group of security professionals who help design the company's security procedures and requirements. Over half of respondents from China (54%) and nearly half from Brazil (44%) say that the primary owner of application security at their companies is Information Security. In contrast, respondents from North America (25%) state that they rely equally on QA and Information Security, followed closely by Operations (21%).

This suggests that, perhaps in more mature markets, security testing is becoming a more mainstream discipline that is being incorporated into the application lifecycle. The question about security ownership also highlights the differences in security attitudes among various industries. One in five respondents in the CPRD vertical states that application security has no primary owner in their organization – suggesting that the CPRD industry may not be paying enough attention to security testing. This is consistent with our other industry findings: for example, retailers often prefer to bring new applications to market faster, rather than focus on thorough testing and security validation.

FIGURE 22

WHO IS PRIMARILY RESPONSIBLE FOR ENSURING THAT YOUR APPLICATIONS ARE SECURE?

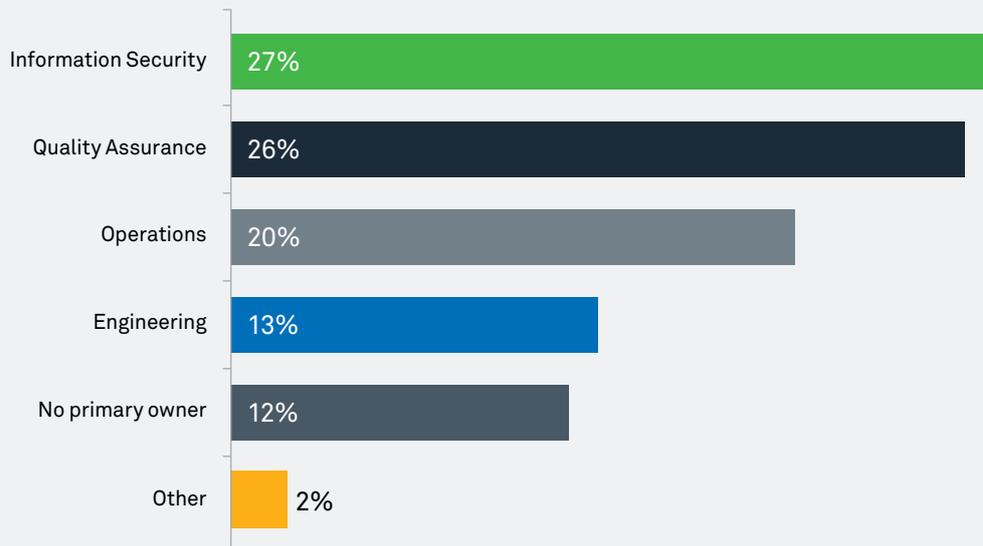
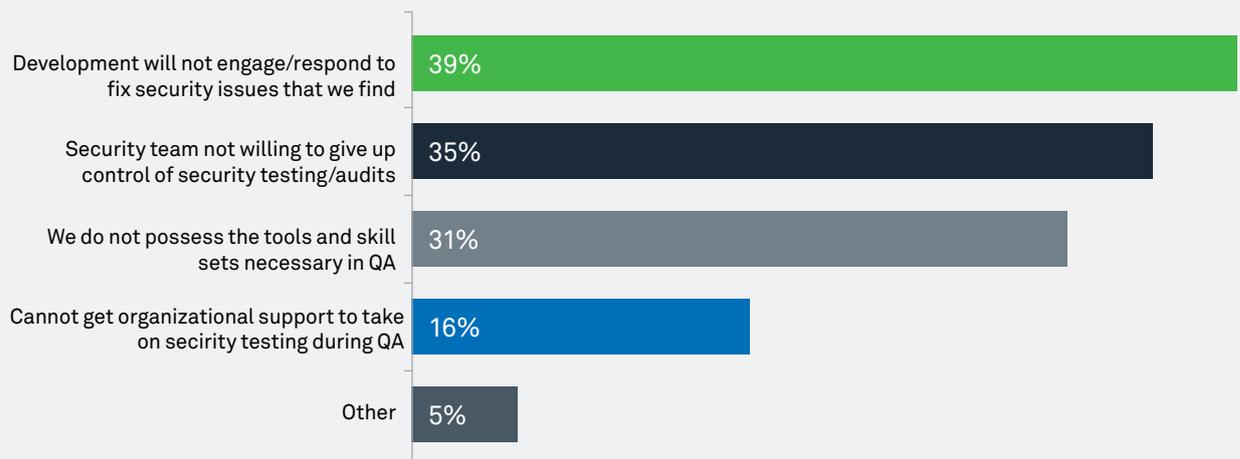


FIGURE 23

WHAT IS THE BIGGEST CHALLENGE TO DOING SECURITY TESTING AND AUDITING DURING QA (SELECT ALL THAT APPLY)?



The two factors that are slowly beginning to change the attitude of businesses toward security testing are government regulations and high-profile security breaches and failures.

Unfortunately, even companies that have a dedicated Information Security team don't always follow their recommendations. The processes designed by security specialists are often overlooked by development and operations teams, and management doesn't see it as a priority, so security practices are neither funded nor enforced. Ideally, application security should be built into the core of the application, however, in reality, development teams are not usually focused on building secure applications from the start, making the job of identifying vulnerabilities and patching potential threats significantly harder downstream. Our survey also finds that there is a significant lack of communication and cooperation among different teams involved in security testing. Over a third (39%) of respondents indicate that developers are not responsive enough when it comes to fixing security issues uncovered by QA and other teams, while an additional third (35%) suggest that their security teams are not willing to give up control of security testing and audit functions. The third most common challenge of security testing is the lack of skills and tools required to perform security audits, which potentially indicates that there is insufficient management support for this activity (see Figure 23).

Most commonly, organizations spend their security funds on network security. Since the introduction of the first corporate networks, companies have been aware of the potential security issues – unauthorized access, denial-of-service attacks, and other malicious activities aimed at their networks. Over time, firewalls were invented, standards introduced, and now most companies automatically assume the safest settings when they build their networks.

Application security, on the other hand, is a lot less mature. Undoubtedly, it will continue to develop and grow in coming years, but at this point, it is still a very young discipline, and application security testing often lacks common goals, standards, and tools. In our survey, very few respondents admit that they are engaged in automated dynamic (6%) or static (10%) security testing. Most companies perform an application security audit by Information Security teams (42%) or have manual source code reviews (21%).

The two factors that are slowly beginning to change the attitude of businesses toward security testing are government regulations and high profile security breaches and failures. With companies of all types doing more business over the Internet, governments and industry authorities are creating new regulations around security, privacy, and data protection. These standards are designed to encourage companies to protect consumer data, and security testing is the way that businesses can prove that they have the right protections in place.

In the survey, less than one in five respondents say that regulations have no impact on their security testing budgets. Over a third of respondents (34%) suggest that less than a quarter of their security testing budgets are dictated by regulatory compliance requirements, with a further 31% saying that between 26% and 50% of the money allocated to security testing is directly correlated with the need to comply with government requirements (see Figure 24). This number varies greatly by country and industry, which is not surprising given specific regulations for different regions and verticals. For example, once again, respondents from CPRD companies state that a third (33%) of their security budgets are completely independent of any regulations, while 26% of companies in the Healthcare and Life Sciences sector indicate that

more than half of their security testing money is set aside to satisfy strict government and industry requirements.

Naturally, highly publicized security failures often act as “wake-up calls” for companies to enhance their security testing practices. There seems to be a constant race between hackers looking for new ways to break through application security barriers and corporate security professionals who are always on the look-out for vulnerabilities and threats. As new technologies and applications enter the market, there will always be new potential security problems. If these problems are discovered by the attackers first, they are likely to attract a lot of media attention, causing corporate IT to spring into action. If, on the other hand, these weaknesses

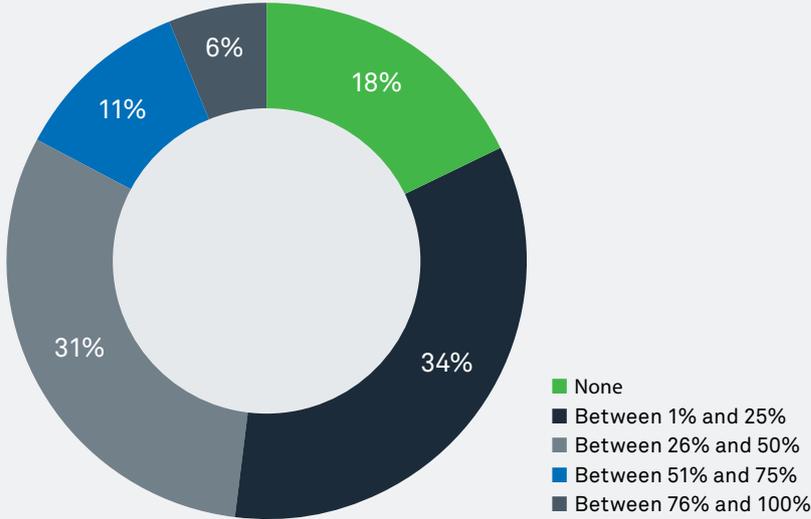
are found by security professionals, they will be documented in industry publications and websites, putting corporate security one step ahead in this never-ending race.

Security testing is an evolving discipline. Just a few years ago, it would have been acceptable to focus solely on finding vulnerabilities in existing applications and patching them to remedy any potential problems. But this approach can no longer keep up with the pace of innovation among the attacker and hacker communities. The only guaranteed way to ensure that applications are secure is to build security into the entire development process, including requirements, design, and code, and to develop IT systems to the highest security standards from the start.

If the complete application lifecycle is managed with security in mind, there is less chance that anything can go wrong. If, on the other hand, QA treats security testing as only an audit function, they are just looking at the latest known threats – and the attackers may already be ahead of them. Security testing used to be just about testing and auditing. Today, it is about remediating potential problems and building applications securely from the start.

FIGURE 24

WHAT PERCENTAGE OF YOUR APPLICATION SECURITY BUDGET IS MOTIVATED BY REGULATORY COMPLIANCE REQUIREMENTS?





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CONSUMER PRODUCTS, RETAIL, AND DISTRIBUTION

The Consumer Drives Technology Innovation

By *Brian Girouard*, Leader, Global Consumer Products, Retail & Distribution Sector, Capgemini and *Norbert Jansen*, Project Center Testing Manager, Capgemini

The Consumer Products, Retail, and Distribution (CPRD) sector represents a large and diverse group of companies including consumer products manufacturers, retailers, distributors (such as logistics companies, postal systems, trucking), and transportation (including airlines, airports, rail operators, etc.) Clearly, organizations in each of these sub-sectors have their distinct technology needs, but they are all part of the broader consumer supply chain and therefore share a close connection to the end-user.

Technology is critical at every step of the consumer products supply chain. Sophisticated IT systems help today's companies develop new offerings and bring them to market, manufacture the right amounts of merchandise, deliver the goods to the correct place, make timely business decisions, analyze large amounts of data, and run retail outlets.

Retailers rely heavily on technology and automation to keep their operations running smoothly and cost-efficiently. Additionally, the technological connections between suppliers and retailers are increasing dramatically, as more sales, shipping, promotion, demand, and inventory data is shared between trading partners. CPRD, however, is an industry with very low margins. Most retailers, for example, operate with margins between 1% and 3% and rely heavily on high sales volumes. Therefore, it is difficult for these companies to allocate substantial resources for investment in new technologies, especially when there's no immediate and substantial return on investment (ROI).

But ultimately, in this industry, technology innovation is driven by the consumer. Retailers are selling a larger percentage of their products online. Consumers can access online stores using computers, smartphones, tablet devices, and kiosks. They use specially designed applications and social media sites to compare prices and make purchasing decisions. This type of consumer behavior forces retailers to become more innovative and use technology to compete for customers' attention. It presents a considerable challenge to this already extremely cost-conscious and low-margin industry. Most retail companies can't afford to spend more than 1% or 2% of their operating budgets on IT. But without additional investment in mobile and Internet technologies, retailers lose their competitive edge. In today's world of the technology-savvy consumer, smaller retailers often lose the battle because they are unable to compete with the larger players on IT spending and technology innovation.

Traditionally, most CPRD companies relied on custom IT systems to support their unique business processes. Naturally, over the years, this approach has created a cluttered IT landscape with a large number of scattered applications – many at the end of their useful life, and too outdated to be integrated with modern technologies and platforms. Today, many IT organizations have embarked on the modernization journey and are adopting a range of packaged systems – such as Enterprise Resource Planning (ERP), Supply Chain Management (SCM), Transportation/Logistics, Workforce Management, Merchandising, Product Lifecycle Management (PLM), CRM, ecommerce, and BI. However, overall the IT landscape in the CPRD industry remains very complex. Even companies who choose to adopt packaged solutions tend to heavily customize and localize their systems, making it harder to keep IT simplified, centralized, and streamlined.

This extensive customization and integration of the new packaged enterprise applications with the old legacy systems often presents quality challenges. It is essential that these interfaces and custom reports be carefully tested throughout the application lifecycle. An interesting dynamic that is specific to this sector is the fact that most retailers will not introduce new software releases into their production environment during their peak selling seasons such as the holidays, back-to-school, etc. This creates a need for tight scheduling of testing and moving software into production. If a window is missed, it can delay the application "go-live" date by months.

Unfortunately, in an industry with such low margins, quality is not always seen as the top IT priority. Retailers are lagging behind other sectors in adopting new technologies

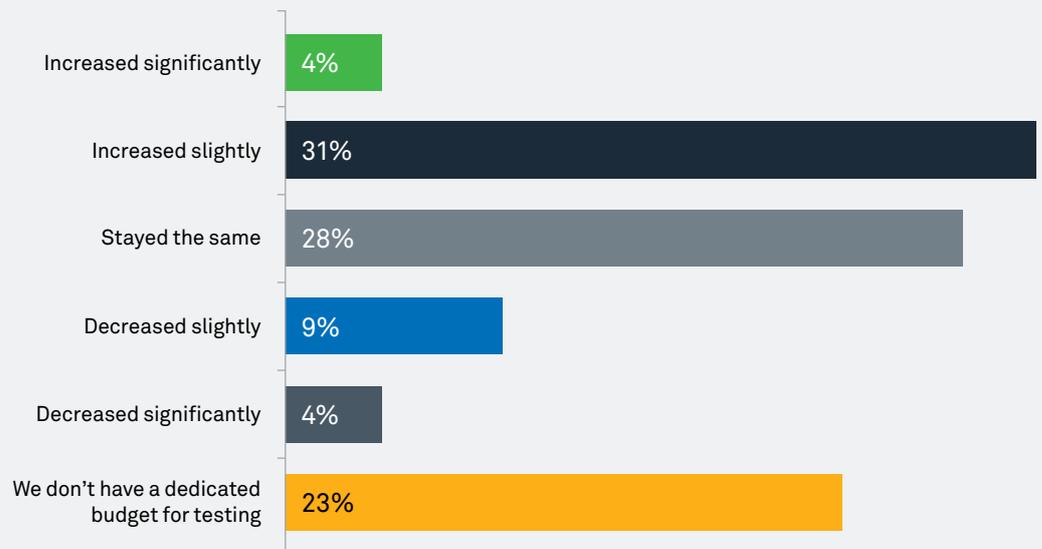
and security awareness. They often see data security and integrity as the domain of the other vendors that they interface with – such as credit card companies – and are very conservative when it comes to spending money on security validation and other types of application testing.

However, as retailers become more sophisticated in their interaction with the consumer and more reliant on data and analytics, their attitude toward software quality is beginning to change. Over a third of the survey respondents (35%) in the CPRD sector say that their QA budgets have increased over the past two years, with a further 28% stating that their budgets for application quality have stayed the same (see Figure 25).

Overall, it is consumer behavior that fuels innovation in the CPRD industry. The margins are unlikely to change and, to stay competitive, companies have to explore new technologies and come up with different, highly innovative ways to attract the price-conscious consumer. Investing in modern technologies is not a guarantee of success or increase in market share, but failure to adopt the latest trends in mobile and Internet commerce and modernize their BI applications is simply not an option.

FIGURE 25

HOW HAS THE PERCENTAGE OF BUDGET ALLOCATED FOR THE TESTING FUNCTION (INCLUDING TESTING PROCESSES, TOOLS, AND RESOURCE COSTS) CHANGED OVER THE LAST TWO YEARS?



ENERGY AND UTILITIES

These changes create a challenge for utility IT departments. On the one hand, they need to continue to develop applications to support new customer interaction models and leverage up-and-coming technologies. On the other hand, as a result of regulatory or competitive market pressures, many Utilities companies have experienced significant cutbacks in their operational costs, and specifically in their IT budgets.

As customer service has become a competitive differentiator, providers have invested in a range of new systems to improve and streamline their customer and operational processes. Furthermore, in an effort to cut costs, energy companies have opted for fewer application customizations to help ensure easier maintenance and future upgrades.

From a testing and QA perspective, this has more recently led to a greater focus on application standardization and the homogenization of the quality processes through the establishment of the TCOE. More companies in the Energy and Utilities sector say that they are planning to implement a TCOE than any other industry in our survey. Nearly three-quarters (74%) of surveyed energy companies state that they have either started rolling out a TCOE or have plans to do so within the next two years.

Standardization is just one example of cost-cutting initiatives by energy companies. In the atmosphere of high competition and low margins, providers at every level have to find ways to reduce spending without compromising application quality. Many turn to lower-cost outsourced partners, which allow them to focus on their core business and innovation, while entrusting a portion of their application development and QA function to third-party providers. Our survey has found that the Energy and Utilities sector is the highest user of the outsourced application testing services. An overwhelming majority (85%) of Energy and Utilities respondents indicate that they rely on external service providers for their QA operations. Furthermore, 18% of surveyed companies in this sector say that over half of their testers are contractors and third-party vendors. This, too, represents the highest number among all verticals.

Often companies outsource large portions of the application implementation, maintenance, and testing effort. Energy and Utility companies also appear more confident having their testers situated in either nearshore or offshore locations. The favored location for outsourcing service providers is nearshore (33%), followed very closely by China (30%). This is the only industry where China is preferred over co-location of resources. China has made enormous investments in alternative energies; initiatives such as Smart City are among the most important government programs; and many of the leading solar and wind energy providers are based in China. Chinese companies are behind many of the latest innovations and cutting-edge Research and Development (R&D), and the country is also one of the largest consumers

Competition—a Major Driver for New Business Models

By *Jan de Jong*, Management Consultant, Sogeti; *Peter W Harris*, Vice President, Smart Energy Services - Europe, Capgemini; and *Steve Harris*, Global Smart Energy Services, Head of Smart Home Services, Capgemini

The Utilities sector is still at the heart of a major structural transformation. Over a decade ago, the UK, the Nordic Region, Continental Europe, and Australasia started the liberalization of, first, the electricity and then gas markets, essentially giving consumers the power to choose their energy retailers. Subsequently, the US has taken steps towards deregulation and the introduction of wholesale and retail competition, on a state-by-state basis. While each region works out its own path, the general momentum is towards multi-utility supply liberalization.

Privatization, deregulation, and the unbundling of previously vertically integrated supply chain resulted in competitive markets, in which energy suppliers have had to focus on improving customer retention and acquisition, as well as on increasing revenues. This, of course, has driven innovation in products and services, as well as improvements in the customer experience. The need to reduce carbon consumption has led to rapid innovation in renewable technologies and the deployment of distributed and micro generation. Together with the desire to improve operational efficiencies, this is driving the use of smart meters and smart grids. From the consumer perspective, smart homes will lead to even more rapid innovation in products and services, and is likely to stimulate energy suppliers to collaborate more closely with partners from other sectors, such as telecommunications, security, etc.

of green energy in the world. These factors have undoubtedly put China in a very positive light for Energy companies around the globe, and perhaps explain their strong preference in outsourcing their IT functions to Chinese providers (see Figure 26).

We expect that the trends for outsourcing and standardizing on applications and quality models are going to increase in the future – especially as, over the next 10 years, we will see huge investment and growth in the use of smart technologies. Smart metering and smart grids rely on hardware and sophisticated communications which must function under a wide range of geographical and environmental conditions. Optimizing solutions and minimizing deployment risks across entire networks requires highly structured and exhaustive testing programs.

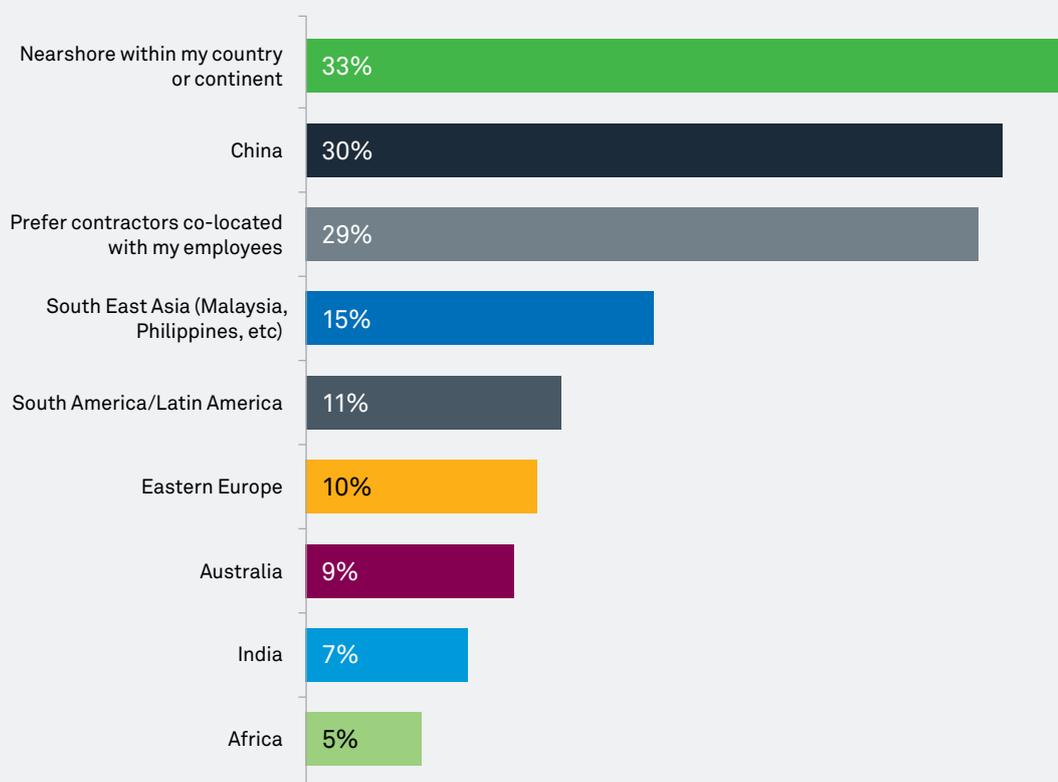
Smart home, for example, brings further challenges as suppliers find ways to help consumers manage energy consumption at home. The lack of standards for home

area networks, the range of in-home technologies (meters, displays, gateways, sensors, smart appliances, etc.) and the range of types of building make it difficult to deploy solutions that work easily. This is compounded by the need to offer different in-home solutions for different customer segments. Again, stringent testing in the lab and in the field is essential. Meters, grids, homes, and other buildings must be seamlessly connected to one another – and to the Utility’s operational and customer systems – to enable uninterrupted data flows throughout the entire value chain. It is essential that there are robust, fault-free IT systems and processes in place to support this transformation.

Analysts also predict that the concept of the smart grid will attract new start-up companies to the market, further increasing competition and heightening demand for innovative products and services. In this dynamic market, IT applications are going to continue to play a significant role, and application quality will remain a key focus of IT management.

FIGURE 26

WHAT WOULD BE YOUR IDEAL GEOGRAPHICAL LOCATION TO CONTRACT AND/OR OUTSOURCE YOUR TESTING ACTIVITIES (SELECT ALL THAT APPLY)



FINANCIAL SERVICES

Focus on Growth for Top-line and Bottom-line Benefit

By *Govindarajan Muthukrishnan*, Global Financial Services and Rightshore® Testing Practice Leader, Capgemini and *Nikhil Joshi*, North American Banking Testing Practice Leader, Capgemini

The Financial Services industry has gone through a major shake-up in recent years. While previous fiscal crises may have been more localized and restricted to specific verticals, the recent economic decline was clearly felt across all geographies and industries. The near-collapse of the capital markets impacted banks, insurance providers, lenders, and all other sectors in this tightly interconnected industry. With the markets beginning to stabilize, all parts of the Financial Services industry are focusing on growth. Banks and credit card providers are looking at increasing revenue by introducing more products and engaging customers through new channels – such as mobile, Internet, and social media. Insurance companies are enhancing their IT systems and launching new programs to increase customer trust and loyalty. Payment service providers are investing in technology to bring new products to market and improving reliability and performance. Finally, the capital markets around the world are focusing on growth through acquisitions and streamlining their existing offerings.

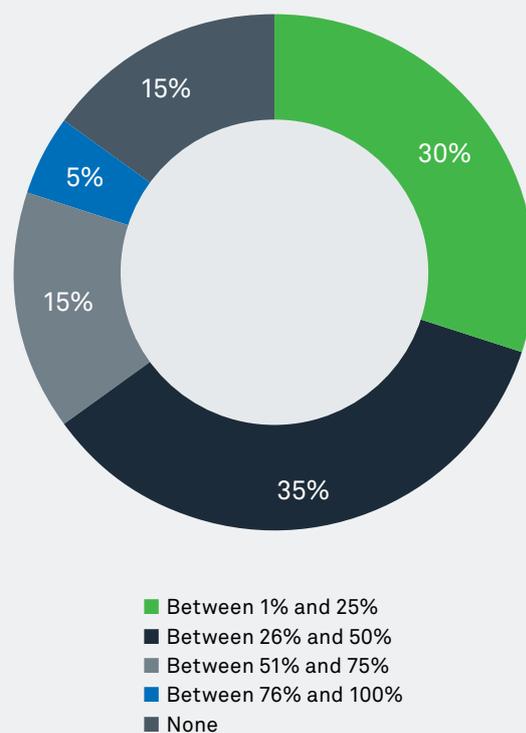
A growing number of Financial Services companies now call themselves technology companies – as their products and applications rely heavily on IT. The business criticality of IT differs by sub-sector – for example, most insurance providers are still driven by customer service and cost, while trading portals cannot exist without a complex and sophisticated technology infrastructure. As the industry recovers, companies aim to direct their IT investment toward innovation – driven by competition and customer

demand. However, a portion of IT funds still has to be directed towards “non-discretionary” areas – such as security and compliance. Our survey of Financial Services IT professionals shows that over a third (35%) of companies in this sector allocate between 26% and 50% of their security budget to satisfying regulatory requirements, with a further 20% investing over half of their security budget into compliance-related projects (see Figure 27).

Large banks and insurance companies, especially in North America and Western Europe, have traditionally invested in building complex, customized systems. As a result, more companies in North America and Europe have established in-house QA organizations with mature quality methodologies and processes. Counterparts in Asia Pacific and other emerging markets are learning from the experience of these technology pioneers and, conversely, are relying primarily on highly standardized packaged applications, focusing more on program management, change control, and integrations.

FIGURE 27

WHAT PERCENTAGE OF YOUR APPLICATION SECURITY BUDGET IS MOTIVATED BY REGULATORY COMPLIANCE REQUIREMENTS?



Financial Services organizations in North America and Western Europe now find themselves dealing with an application landscape that is too complex to maintain, integrate with modern IT platforms, or change, but too costly to replace. Old technologies are also unable to provide the functionality required to support the new, modern ways of interacting with the consumer – such as mobile banking and payments. Consequently, even the most mature banks, insurers, and payment service providers are actively engaging in modernization initiatives, aiming to simplify, standardize, and consolidate their IT systems.

Reducing the complexity of the IT landscape also means streamlining quality management functions. While only 1% of survey respondents say that they have a fully operational TCOE, one in four respondents (27%) suggest that their companies are planning to develop an internal TCOE within two years, and an additional 20% have plans to use a third-party company to consolidate their QA function.

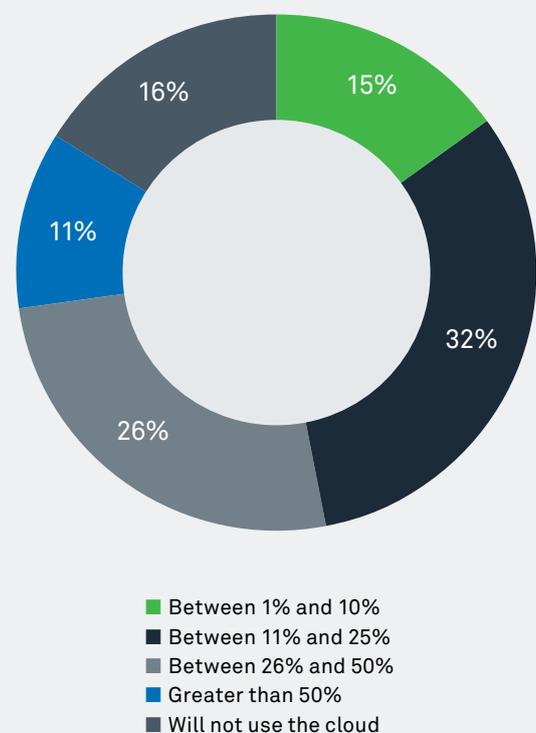
Outsourcing quality management is familiar territory for Financial Services companies, helping to reduce costs. Nearly three-quarters (73%) of respondents say that their companies use contractors or outsourced third-party testers. North American companies are the highest users of outsourced testing services and prefer to place their contracts with providers in China, India, and Eastern Europe. European organizations prefer co-location and nearshore vendors, thus taking less advantage of the cost-saving opportunity.

Financial institutions are also embracing new ways of deploying and consuming IT services. Cloud computing has evolved to be more than a buzzword in the world of financial services, with smaller organizations such as community banks and credit unions choosing SaaS and cloud-based applications over having to build and maintain their own data centers. Larger organizations with greater IT budgets prefer to invest in private cloud infrastructure citing security and data integrity concerns. Overall, only 16% of survey respondents say that they are not interested in migrating their applications to the cloud. Over half (58%) of Financial Services respondents state that they intend to move between 11% and 50% of their applications to the cloud environment, with a further 11% suggesting that more than half of all their IT systems will be in the cloud over the next year (see Figure 28).

Financial Services QA teams now consist of business analysts, technical architects, and testing specialists who are responsible for the strategy, planning, and execution of the QA function. Similar to other verticals, the goal of IT in Financial Services companies is to align closely with the business and deliver applications that meet business requirements and keep key processes running reliably and without interruption. Financial services companies regard application quality as essential to their operations and to the user experience. The commitment to quality is apparent in the survey results — with 41% of survey respondents saying that their QA budgets have increased over the last two years and an additional 35% stating that their budgets have stayed the same despite the recession. As financial markets continue to recover, we expect to see continued commitment to quality, modernization, and innovation.

FIGURE 28

WHAT PERCENTAGE OF TESTERS AT YOUR COMPANY ARE CONTRACTORS AND/OR OUTSOURCED TO A 3RD PARTY VENDOR?



HEALTHCARE AND LIFE SCIENCES

Using Technology to Support Innovation and Cost Savings

By Yves Dène, Quality and Compliance Advisor, Sogeti and Anne Kerckx, Quality and Compliance Advisor, Sogeti

The Healthcare and Life Sciences sector includes companies in the Pharmaceutical industry such as R&D, operations and production facilities, medical device manufacturers, as well as stakeholders in the public health sector. The industry itself is highly competitive, and the current state of IT investment clearly reflects this. The complexities associated with bringing new medicines or devices to market create a tremendous cost overhead. Today, IT plays a critical part in every aspect of the Pharmaceutical industry's operations, and Healthcare companies remain on the cutting edge of the technological innovation. During the economic downturn, Pharmaceutical companies were forced to curb their IT budgets, but not investing in information technology is simply not an acceptable alternative. To remain at the forefront of innovation, Healthcare businesses are finding ways to do more with less.

Today, many of the large Pharmaceutical companies are taking inventory of their IT systems as they are attempting to globalize and standardize their IT portfolios. They are working on reducing the number of applications as a measure to reduce costs. This, however, is proving to be an exceptionally difficult exercise. Naturally, it is hard to find packaged applications that provide the exact functionality that custom systems were precision-built to support. Additionally, most Pharmaceutical companies have multiple subsidiaries around the world that are used to their own, specific ways of working, and it is not easy to consolidate a large number of older, heavily customized applications into

a single standardized system. Application modernization initiatives also require large initial investments, and by the time the new global system is operational, it can consume considerable IT resources. Plus, there is no guarantee that all divisions of the company will be aligned with the global requirements and will be successful in overcoming inertia and resistance to change.

Despite the large investment required for modernization and the obvious challenges, application consolidation and modernization are a necessity for today's Pharmaceutical companies. Their operations and processes are becoming more globalized; take, for example, the process of clinical trials. Traditionally, clinical trials took place close to the company's facilities, but the cost of running these complex programs locally has escalated so dramatically in recent years, that companies are increasingly looking to move parts of, or even the entire process, offshore – to locations such as China or India. In order to support this migration, pharmaceutical companies need modern IT infrastructure capable of handling sensitive data in a timely, secure, and cost-efficient manner. As a result, even in times of recession, making investments in centralized, consolidated and updated IT systems is absolutely critical for Healthcare businesses.

Quality is considered one of the most important factors in the Healthcare industry. Application functionality, usability, and performance are essential to the core operations of Healthcare companies, but even more critical are data integrity, availability, and security. One of the fundamental requirements of the Pharmaceutical industry is to ensure that computerized systems provide reliable data. Data integrity lies in the core of the regulations issued by government bodies such as the US Food and Drug Administration (FDA) or the European Medicines Agency (EMA), and company policies around data security are subject to local government and industry reviews and audits. Similar to the Financial Services industry, where even a small discrepancy in each individual transaction can add up to large errors, even minor inconsistencies in pharmaceutical data can skew the results of a clinical trial or other important events. More importantly, data errors in the Pharmaceutical industry can have a catastrophic impact on people's lives – with patients not receiving the right treatment or even harming people in the worst-case scenario.

Detailed guidelines govern all aspects of data security in the Pharmaceutical industry. Specific regulations such as FDA 21 CFR Part 11 or EU Annex 11 are designed to address the issue of electronic records and electronic signatures used in critical computerized systems. Our survey confirms that most pharmaceutical companies have adopted a lifecycle approach to application and data security where security is addressed throughout the system design, development,

and QA phases (see Figure 29). Working in a regulated environment places additional demands on QA skill sets. In addition to knowledge of applications, platforms, and quality tools and practices, QA team members are required to have domain expertise and experience in regulatory compliance.

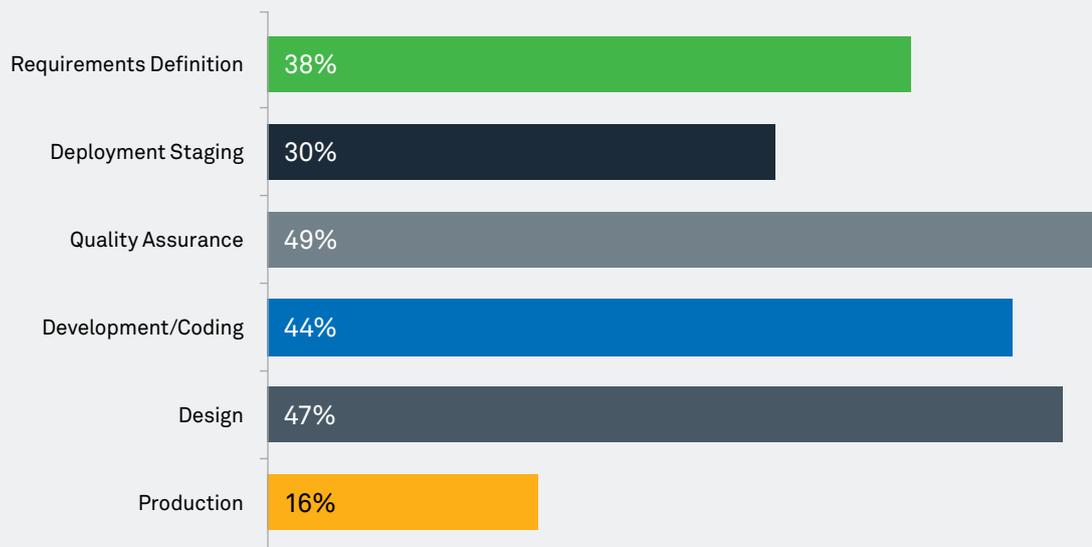
Data security and integrity concerns also play a key role in selecting new technologies – such as cloud computing. Although a majority (81%) of survey respondents state that at least some of their applications are on their way to being migrated to the cloud within the next two years, security is listed as the number one risk for using the cloud. Given the sensitive nature of some of the information handled by Healthcare companies, we expect that the systems being moved to the cloud will mostly be ERP packages supporting Logistics, Human Resources, or Finance functions. The most mission-critical production applications such as the IT systems that control core manufacturing processes are unlikely to be hosted in a cloud environment. Similarly, any information containing patient data is almost certainly going to remain housed within on-premise data centers due to country-specific privacy regulations.

One area that is likely to benefit from cloud technologies is application testing. The majority of surveyed pharmaceutical companies (73%) say that they use external contractors or third-party vendors for QA-related activities. Nearly two thirds of Healthcare survey respondents indicate that a portion of their testers are working in a nearshore or offshore facility. Having testing environments available on the cloud and using SaaS-based testing software licenses can significantly improve collaboration between the offshore providers and in-house project teams.

As the economic situation continues to improve, the level of IT investment among Healthcare companies will improve, as well. However, the new wave of spending will no longer be intended for maintaining a company's complex legacy applications. Pharmaceuticals will instead direct their IT resources to support innovation, modernization, and globalization. Application quality, security, and compliance will continue to be important disciplines for this sector due to the sensitive and highly regulated nature of their business, and Healthcare companies will always look for new ways to increase the efficiency of their QA operations.

FIGURE 29

IN WHAT PHASES OF THE APPLICATION LIFECYCLE DO YOU ACTIVELY PARTICIPATE IN APPLICATION SECURITY ASSURANCE ACTIVITIES (SELECT ALL THAT APPLY)?



HIGH TECH

High Tech companies began a period of slower spending even before the recession, and today, as the economy continues to improve, there is a definite backlog of projects that haven't been funded. The difference, however, is that High Tech companies are not planning to simply pick up where they left off. Over the years, business needs have changed and new technology solutions emerged, so it is fair to say that High Tech companies are entering a period of re-evaluating their IT priorities and realigning IT resources with the changing needs of the business.

Re-evaluating Priorities and Realigning with the Business

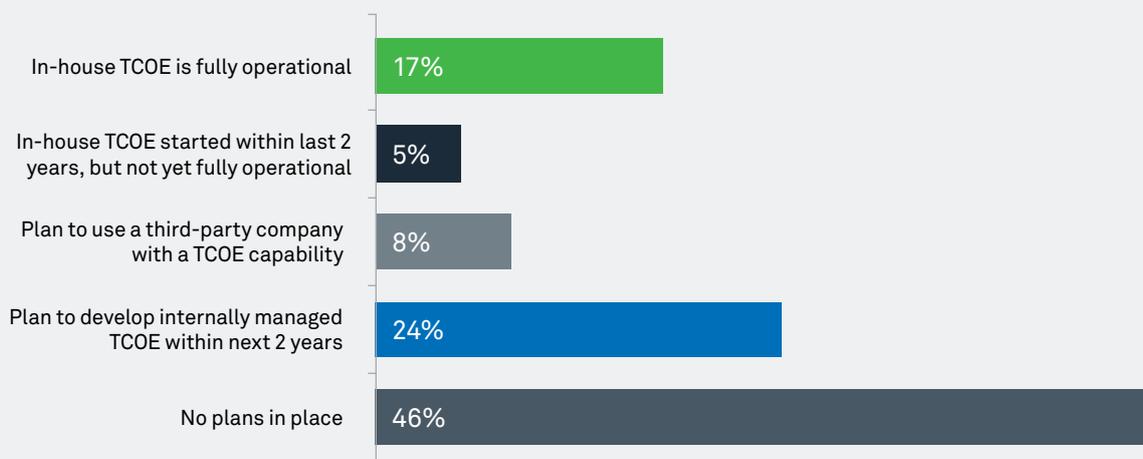
By *Peter Khoury*, Vice President, High Tech leader for the West US and *Jean-Pierre Hervé*, National Testing Manager, High Tech, Sogeti

Capgemini's High Tech sector combines a diverse group of companies involved in computers and peripherals, consumer electronics, printing and imaging, telecommunications equipment, software and services and semiconductors.

While High Tech is among the fastest-changing industries in the world, the biggest shift in recent years has been in how consumer technology companies handle relationships with their channels and customers. Fierce competition compels technology companies to create distinct marketing messaging and programs for each of their target segments and keep a laser-sharp focus on the effectiveness and results of those campaigns. As a result, we see increased investment in IT systems that help improve customer interactions and track the success of marketing and sales programs. There has also been renewed focus on mobile technologies, as consumers expect to conduct more business using their smartphones and tablet devices.

FIGURE 30

WHAT ARE YOUR COMPANY'S PLANS TO CREATE A STANDARDIZED/INDUSTRIALIZED TESTING CENTER OF EXCELLENCE (TCOE)?



Not surprisingly, applications that are directly interfacing with the consumer are getting the most attention when it comes to QA. High Tech companies have always raised a higher bar to the quality of their internal applications than most other sectors. At their heart, technology companies are typically engineering venues, and quality standards and frameworks are ingrained in their operations. Many High Tech companies follow established frameworks such as the Information Technology Infrastructure Library (ITIL) as guidance for their application development, testing, and operations. The survey findings confirm that companies in the High Tech sector are ahead of all other industries in establishing a standardized, centralized quality process. An overwhelming 17% of respondents from high-tech companies say that they are running a fully operational TCOE. This is more than five times greater than all other sectors, where an average number of established TCOEs are around 3% (see Figure 30).

While other sectors prefer to outsource a substantial part of their QA function to external contractors and third-party service providers, technology companies often choose to keep their QA expertise and resources in-house. The survey results show that as much as 35% of the High Tech sector respondents are reluctant to use the services of external QA providers. In fact, technology companies were among the earliest adopters of outsourcing practices. They were engaging with vendors in India and other offshore locations long before many of the other industry sectors. Today, the approach of High Tech companies to outsourcing has matured and they can use their past experiences to determine the right mix of internal and external resources for each specific task. Many technology companies have realized that there's great value in maintaining internal expertise and standards around application quality. While they may be willing to outsource some aspects of testing, maintaining the standards and governance around the QA process and the relationship with outsourced service providers is viewed as an internal function (see Figure 31).

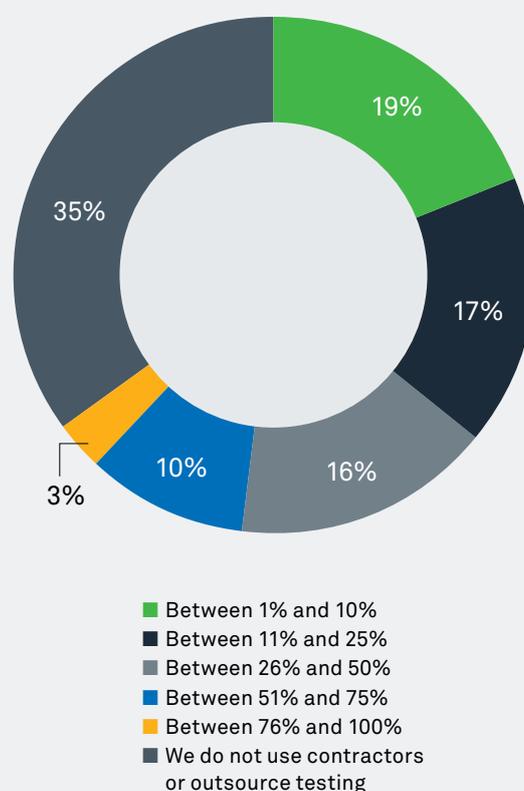
The same element of industry maturity explains why High Tech companies are ahead of several sectors in migrating their applications to the cloud. Over half of our survey respondents (56%) suggest that they plan to migrate between 11% and 50% of their applications to the cloud, while an additional 13% say that they will move more than half of their applications to the cloud infrastructure. Technology vendors are very familiar with the concept of service delivery through shared networks, and have been among the earliest

adopters of cloud computing. Technology companies are well positioned to judge the relevance of these technologies to their business models and the appropriateness of which applications are best suited to be used in the cloud.

As profits increase and IT spending grows, we expect High Tech companies to continue investing in applications and platforms that will help them to better respond to the changing business needs and streamline their interactions with the customer. These companies have always been among the earliest adopters of emerging technologies and business practices. Today, they have reached the level of maturity that helps them make the right decisions on what innovations and trends are the most promising to deliver value to the business.

FIGURE 31

WHAT PERCENTAGE OF TESTERS AT YOUR COMPANY ARE CONTRACTORS AND/OR OUTSOURCED TO A 3RD PARTY VENDOR?



MANUFACTURING

Lessons Learned from the Recession

By *Nick Gill, Vice President, Global Manufacturing Sector Leader, Capgemini*

The Manufacturing sector represents a diverse set of companies. Our focus for software testing in this sector includes primarily automotive and aerospace industries; defense and high-tech manufacturing; and the builders of industrial equipment and heavy machinery. These companies represent the most technology-intensive area of manufacturing, and highlight new and emerging trends in IT spending and QA.

For decades, manufacturing has relied heavily on technology for production processes, and today IT systems have become essential to virtually every aspect of the product lifecycle. Even the products themselves are becoming more and more software-centric. Take a car for instance – two decades ago, most of its value would have been in its parts and the metal of which it was made. Today, nearly half the value is the software that runs most of the car's essential systems. Along with the other verticals, the Manufacturing sector is in the midst of a digital transformation. Production facilities now have more technology and fewer people. Paper-based design and prototyping processes are giving way to digital information that becomes the foundation of the manufacturing process. The different stages of the product lifecycle are now tightly linked together, and the digital information from engineering and manufacturing continues to carry through to the after-sales and services areas, with software systems precisely managing and storing all the relevant data.

The manufacturing value chain begins with R&D and engineering, followed by manufacturing, distribution, supply chain, marketing and sales, and, of course, services. Additionally, like all companies, manufacturers have a variety of essential supporting functions such as Finance and HR. Today's manufacturing companies spend money on the two ends of their value chain: increasing innovation on the R&D side, and reaching out to new markets and new customers on the marketing, sales, and services side.

The recent economic downturn has had a profound effect on the entire Manufacturing sector. IT spending declined sharply, and companies were forced to stop most discretionary contracts and just focus on running the business the best they could to get through rough times. When the economy started showing signs of recovery in late 2009, many Manufacturing companies chose not to return to the old days of spending large amounts on application maintenance, and opted to take a fresh look at their application portfolios. Through application retirement, consolidation, standardization, and virtualization, IT could significantly reduce its maintenance expenses and free up the resources to invest in innovation and forward-looking projects.

Application modernization is quickly becoming one of the top IT initiatives in nearly every Manufacturing company. Many IT departments are choosing to consolidate their HR, Finance, and other supporting functions into centralized ERP systems. Some of the lighter, less complex manufacturers are also embracing ERP systems for their supply chain management. Naturally, the more complex manufacturers – such as aerospace, aeronautics or automotive – with their sophisticated processes, still continue to rely on complicated, custom legacy systems. But as companies gradually return to the pre-recession levels of IT spending and continue to expand into new geographies and new product lines, they will move to more centralized, harmonized, and standards-based IT systems.

A similar trend can be observed in application quality. Manufacturers are moving towards establishing TCOE at a faster pace than any other industry – except Technology (a sector that in fact also includes high-tech manufacturing companies). Seven percent of our Manufacturing sector survey respondents indicate that they have a fully operational in-house TCOE, and a further 8% say they have started building a TCOE, but it is not yet working at full capacity. These findings demonstrate the mature position of manufacturing companies with respect to industrialization and higher quality standards compared to other verticals.

In fact, IT across all industries has borrowed many concepts and methodologies from manufacturing. The most commonly used software quality standards and practices such as Six Sigma and Total Quality Management (TQM) have been influenced by the factory processes. Today, Manufacturing companies are among the strongest supporters of quality frameworks and consistently measure quality metrics across the entire company.

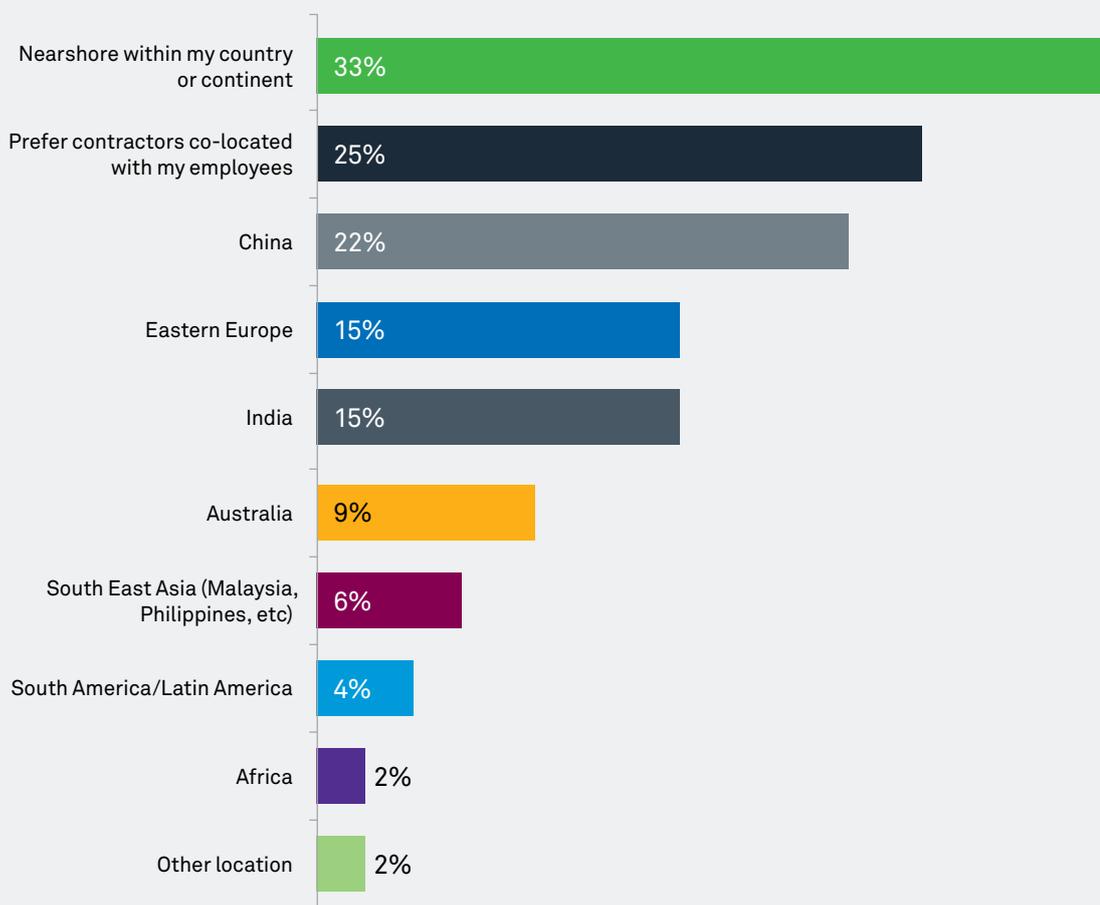
Another familiar concept to manufacturers worldwide is the outsourcing of factories and Manufacturing centers in order to leverage economies of scale and available skilled labor in lower-cost geographies. Our survey shows that Manufacturing companies are comfortable with the concept of QA outsourcing, with 50% of the respondents saying that between 11% and 50% of their testers are contractors or outsourced third-party vendors, and a further 7% indicating that between half and all of their testers are not part of the in-house QA group.

Similar to other industries, Manufacturing companies prefer co-location of resources, but unlike other sectors where India dominates as the leading offshore location of QA, China leads in the Manufacturing industry. The first preference for outsourcing is nearshore within the Manufacturer's country or continent (33%). The second preference is a close split between co-location (25%) and outsourcing to China (22%). This comes as no surprise, as manufacturers are accustomed to partnering with providers in China, which has essentially become the manufacturing center of the world (see Figure 32).

Manufacturers view China as a business partner. In addition to being a trusted "buy from" country, China is quickly emerging as a lucrative "sell to" market. Many companies in the Manufacturing sector are moving their entire IT operations to China in order to stay ahead of this promising opportunity.

FIGURE 32

WHAT WOULD BE YOUR IDEAL GEOGRAPHICAL LOCATION TO CONTRACT AND/OR OUTSOURCE YOUR TESTING ACTIVITIES (SELECT ALL THAT APPLY)?



PUBLIC SECTOR

Nevertheless, despite budget constraints, governments worldwide must continue to invest in IT. New policies, changes in current regulations, requirements for better information sharing between departments, and citizens' demands for faster, more convenient interactions with their local and central governments fuel the need for further IT investment. In addition to underutilized data center resources and many outdated legacy systems, governments would like to have the capacity to provide their citizens with the same level of online interaction as the private sector. In countries where people enjoy the ease of online shopping, banking, payments, and customer service, having to wait at public offices, make numerous phone calls, or mail hard-copy papers is a noticeable inconvenience.

Many Public Sector organizations around the world are now aiming to change this pattern by investing in technologies such as cloud computing to:

- Modernize, restructure, and renew their IT infrastructure, platforms and applications
- Increase returns on their investments
- Provide citizens with an easier way to engage with their public service organizations

Our survey confirms that many of the Public Sector respondents have plans to host or migrate some portion of their applications on to the cloud. Nearly half (46%) of respondents say that they are planning to move between 11% and 50% of their applications to the cloud environment, while an additional 8% state that their organizations will be migrating over half of all applications to the cloud (see Figure 33).

Naturally, not all government applications will become the domain of the public cloud infrastructure. Certain classes of information are meant to be treated with the highest levels of security, and will most likely reside in some variation of a private cloud, which will still allow the agencies to utilize the architectural principles of cloud computing and realize the cost-saving benefits of the cloud, while protecting their most sensitive data. A cloud infrastructure should also improve the ability of different departments and organizations to share information. For example, a lifetime event for a citizen such as the birth of a child requires actions that span several agencies – tax, healthcare, benefits, etc. The most effective way to handle these types of events would be a private cloud environment that allows for unrestricted movement and sharing of secure data behind the firewall.

The rapid adoption of new technologies such as cloud computing, combined with the immediate need to support new government programs and policies, is creating the

The Perfect Storm for QA

By *Bob Scott*, VP Business Development, Global Testing Services, Capgemini; *Stanislas Cozon*, Managing Director, Global Public Sector, Capgemini; and *Nancy Meiers*, Director of IV&V, N.A. Public Sector, Capgemini

The global Public Sector is comprised of multiple domain areas, including tax, welfare/social care, public security, public healthcare, defense logistics, local, regional and national government, and a variety of other government branches and organizations. Similar to their counterparts in the private sector, public services organizations rely heavily on technology to automate and streamline their back-office operations, as well as provide efficient means to better interact with citizens.

The recent economic decline has put Public Sector IT in the spotlight. With tight budgets and a growing public demand for innovation and efficiency, governments around the globe are forced to reevaluate their application and infrastructure portfolios to find ways to reduce costs and modernize their operations. Simply put, governments do not have either unlimited funds or public support to continue running old, obsolete IT systems or to make unrestrained infrastructure investments.

As an example of the issues facing the Public Sector globally, the February 2011 US Federal Cloud Computing Strategy report indicates that the US Federal Government's current IT environment is characterized by low asset utilization, fragmented demand for resources, duplicative systems, environments that are difficult to manage, and long procurement lead times. It specifically states that these inefficiencies negatively impact the Federal Government's ability to serve the American public and must be remedied.²

² Federal Cloud Computing Strategy, February 8, 2011. <http://www.cio.gov/documents/Federal-Cloud-Computing-Strategy.pdf>

“perfect storm” for QA. In light of the highly-publicized government IT failures of the recent years, today’s Public Sector IT organizations have to pay utmost attention to application quality to make sure that this time they get it right. However, internal QA may not have the right skills and techniques to test the new class of emerging technologies such as mobile Internet, cloud, or virtualization. Plus, similar to the rest of government IT, QA budgets have been cut. With 17% of survey respondents suggesting that QA budgets in their Public Service organizations have been reduced over the past two years, it is the highest level of decreased QA budgets among all verticals.

Perhaps the answer to this predicament lies in outsourcing – a cost-effective way to add outside expertise to internal QA teams. Our survey shows that currently Public Sector organizations are among the lowest users of third-party providers to supplement their in-house QA skills and knowledge. A third (33%) of respondents from the Public Sector organizations say that they don’t use contractors or outsource the testing function. Additionally, those organizations that do outsource largely prefer their

resources to be co-located with their offices or based in a nearshore facility – unlike their private sector counterparts who commonly subcontract to offshore locations with lower labor costs. Nevertheless, we believe that outsourcing is going to play a bigger role in Public Sector QA in the future.

Furthermore, a growing number of Public Sector organizations are beginning to adopt Independent Verification and Validation (IV&V) practices, which require an objective third party to provide oversight to government agencies and focuses on enterprise, program, and project level risk management to drive down costs, improve quality, and effectively respond to customer needs. IV&V brings the following types of advantages to any given project:

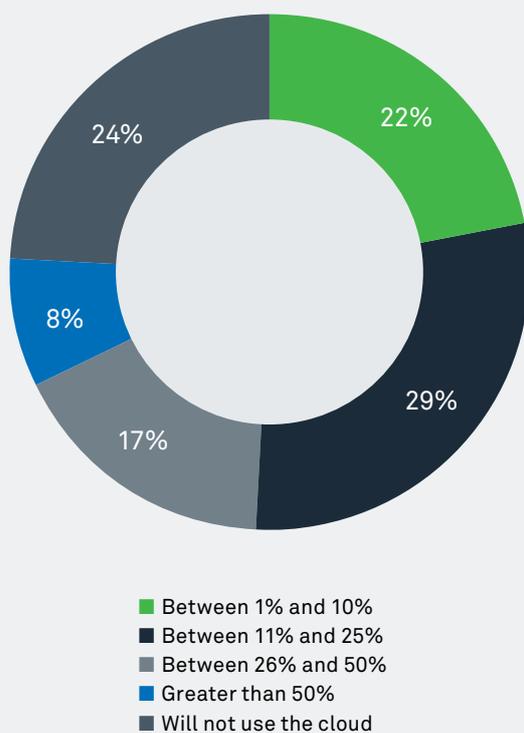
- Secure, reliable, high quality services through fully vetted systems
- Improved secure public access to information resources and government services
- Process consistency and repeatability across programs
- Lessons learned aligned with industry best practices

IV&V enables informed decision making based on an unbiased assessment of what is and is not working on a program. It is a highly effective risk mitigation strategy that increases the probability of producing a quality product and provides an early warning system for schedule and scope creep. The focus of IV&V is on activities that provide the most value based on specific agency needs, such as identifying and prioritizing defects, issues and critical risks and recommending realistic mitigation strategies. Utilizing IV&V on IT programs results in systems that provide value and support agency objectives.

Getting it right the first time is the mantra of today’s Public Sector IT. Despite the unstable economy and severe budget cuts, we believe that with the right focus on new technologies and application quality, the Public Sector will find the way to increase efficiency and deliver innovative IT solutions to help support their core functions.

FIGURE 33

WHAT PERCENTAGE OF YOUR APPLICATIONS DO YOU EXPECT WILL BE HOSTED OR MIGRATED TO THE CLOUD OVER THE NEXT YEAR?



TELECOMMUNICATIONS, MEDIA, AND ENTERTAINMENT

– especially now that the economy is improving and IT spending is once again, albeit slowly, on the rise. However, investing more money into new offerings means that companies must cut costs associated with delivering their core commodity services.

One such popular cost-saving measure is migrating from custom-built legacy applications to packaged ERP/CRM billing solutions that have become very specific to the market served. The upgrade from highly specialized systems to standard platforms is not easy, as transactions in the TME sector are very complex, and operations volume is extremely large. However, the cost savings of centralizing, consolidating, and simplifying back-office systems far outweighs the migration challenges.

With the boom of mobile applications, many carriers are also making investments in mobile applications and mobile application stores, which bring new quality challenges. In addition to the testing of every new device from device manufacturers and validating that these devices work on the carriers' networks, the carriers also have to fully validate the functionality, performance, and security of each individual mobile app and then finally certify third-party applications to ensure that they meet application store standards. All these activities can cause a huge delay and potential loss of business in the entire supply chain if not appropriately automated or efficiently executed.

Cost-efficiency and customer retention are also the drivers behind the growing importance of application quality for TME companies. IT simply cannot afford to have faulty applications or inefficient IT systems. If a customer-facing web site is not available or has functional errors, or a back-office billing system is not generating correct customer statements, the provider runs a real risk of losing the customer to competition. Our survey confirms that Telecommunications companies are willing to increase their QA budgets to ensure better service quality. Over half (54%) of TME sector respondents say that their testing budgets have grown in the past two years – the second largest increase of all sectors behind only the Energy and Utilities sector.

In addition to increased QA spending, TME companies enjoy stronger outsourcing relationships than many other industries. Since telecom service providers already outsource a large portion of their IT infrastructure, they can naturally extend these outsourcing practices to include application quality. In our survey, TME is the number one consumer of outsourcing testing services, with 79% of respondents stating that their companies use contractors or outsourced third-party providers for their QA function. TME companies are also among the highest (70%) users of nearshore and offshore QA services, with 21% preferring nearshore within their country or continent, 13% willing to contract their

Using Technology for Competitive Advantage

By Mark Buenen, Global Testing Services, Telco lead, Sogeti and Pierre Marin, Solutions and Alliances, TME Sector, Capgemini

The Telecommunications, Media, and Entertainment (TME) sector includes a variety of telecoms businesses such as Internet, cable, and mobile service providers, as well as network equipment suppliers and media and entertainment companies. It is fair to say that TME is among the fastest-paced and most innovative industries, with companies continuously revising their business models, offering new packages, and bringing additional services to their clients. In just a few years, telecommunications companies have shifted from offering mostly landline phone services to delivering multiplay bundles that include everything from mobile service to broadband Internet, and even TV. In addition, TME companies are rapidly moving towards online interaction with their customers. A growing number of consumers are conducting most of their transactions such as paying bills or ordering new services using their computers or mobile devices. Naturally, these innovations are putting enormous pressure on IT to build, integrate, and maintain applications that can support the new TME business and consumer behavior.

The challenge is that competition among telecom service providers is increasingly harsh, and customers often view phone and Internet services as a commodity. Mostly driven by price, consumers can effortlessly switch from one provider to another. So providers have to find ways to offer attractively priced packages, as well as differentiate themselves by offering new products, better customer service, and faster access. Most service providers are willing to invest IT funds in value-added products

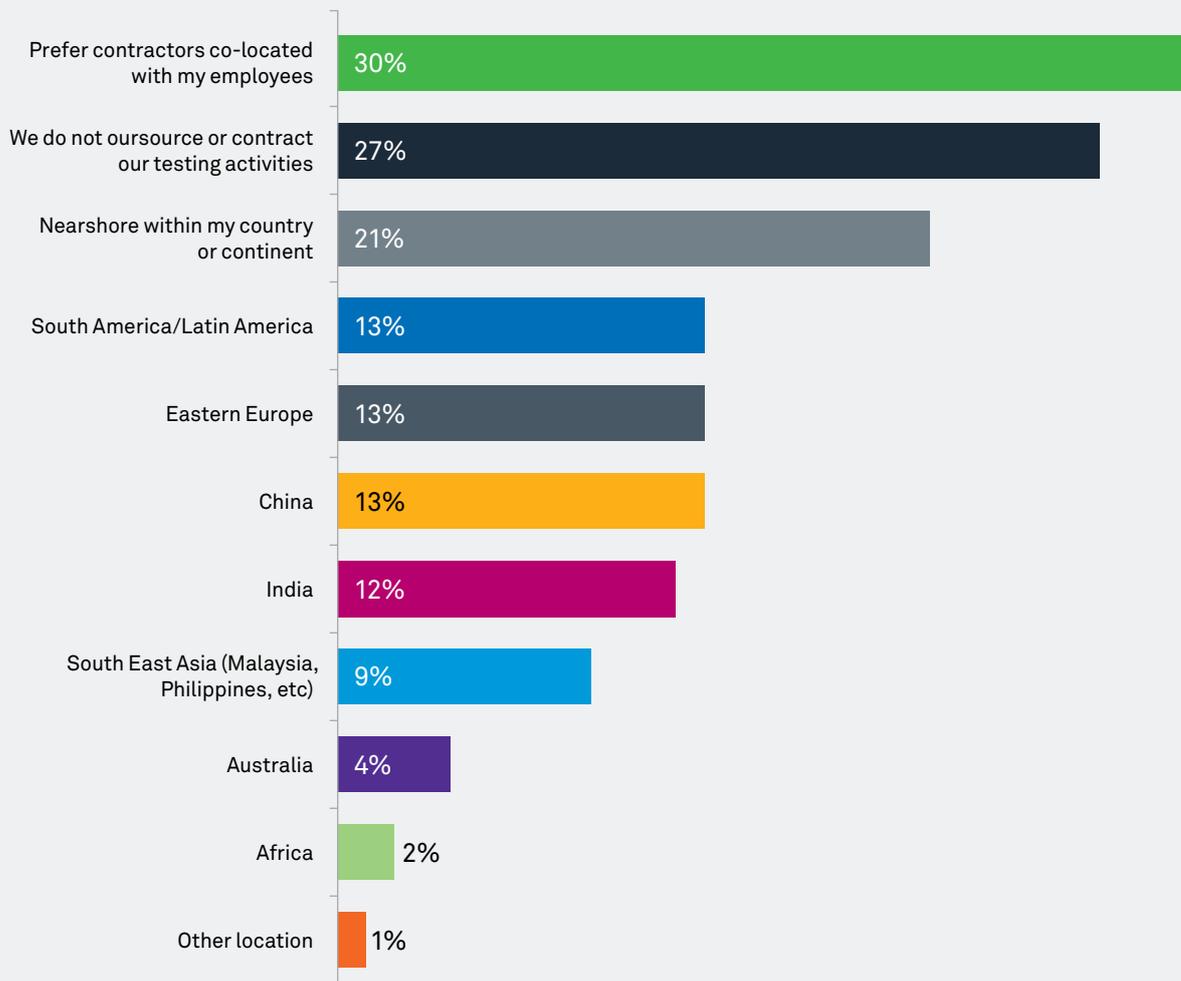
QA function out to providers in China, and another 13% to Eastern Europe. An equally popular outsourced destination for TME is South America (13%), suggesting perhaps that the choice of outsourced partner in this highly competitive and cost-conscious industry is largely dictated by price (see Figure 34).

Having too many different vendors however can be difficult to manage and does not improve the efficiency of the QA team. Successful TME companies are beginning the process of consolidating their outsourced partners and testing practices into centralized and standardized TCOE. While only 4% of Telecommunications companies can say that they have a fully functional TCOE, a majority of survey respondents (61%) indicate that their companies have either plans or ongoing efforts to create a TCOE within the next two years.

The market for Telecom services is growing exponentially, but the competition among service providers also continues to intensify. The once-regulated markets are now open, and telecom companies that previously enjoyed the monopoly on their services have to compete fiercely for customers. The evolution of network and service platforms based on IMS and 4G LTE technologies is fueling this competition even further, creating additional demands for IT and testing to ensure that all system components work seamlessly together. The winners in this game will be the companies who find ways to operate efficiently on a global scale and deliver better quality services at a competitive price.

FIGURE 34

WHAT WOULD BE YOUR IDEAL GEOGRAPHICAL LOCATION TO CONTRACT AND/OR OUTSOURCE YOUR TESTING ACTIVITIES (SELECT ALL THAT APPLY)?





COUNTRY ANALYSIS

Australia	66
Brazil	68
China	70
France	72
Germany	74
The Netherlands	76
The Nordic Region	78
North America	80
United Kingdom	82

AUSTRALIA

Nick Finlayson, Global Testing Services, and Melanie Brock, Senior Test Consultant, Australia/New Zealand, Capgemini



Australia is a dynamic market, with a strong, competitive, and industrialized economy, and has managed the global economic recession relatively successfully. It has a strong service sector including financial services, with key exports in energy, manufacturing, and agriculture.

The focus on QA across Australian organizations has increased markedly over the past year, due mostly to negative press coverage received by a number of large Australian private and government organizations. With several major application release failures – a number of them banking related – and the publicity that followed, the profile of QA has been significantly raised. This is evidenced by an increase in budgetary allocation to QA in Australia, with 37% of the survey respondents indicating that their testing budgets had increased.

Australia is also unique in Financial Services IT, with all four top-tier banks considering or actively implementing new core banking platforms. This has generated huge demand for both legacy system and modern core banking package skills, and, with it, increased demand for QA.

Top Trends

- Focus on QA increases
- Growing need for testing resources

With organizations demanding increased QA visibility, governance, process improvement, and reporting, Australia is seeing a growing need for testing resources. As a result, more than half of Australian organizations are now using contractors or are outsourcing to meet their businesses testing requirements. With that said, only 42% of survey respondents say that testers are working in a nearshore or offshore location. Australian organizations remain reluctant to move their QA capabilities offshore. This trend is very different in the rest of Asia Pacific, where 90% of organizations show preference for offshoring their testing resources. In Australia, the survey shows that Australian organizations are primarily moving application design and architecture, development, performance testing, and security testing tasks offshore.

37% OF THE SURVEY RESPONDENTS INDICATE THAT THEIR TESTING BUDGETS HAD INCREASED

With regards to test metrics, 70% of respondents are confident that their QA and testing tools accurately measure the success of the QA function in their organizations. Over a quarter (27%) of respondents use internally developed testing methods to estimate the QA effort, and 31% estimate the QA effort from previous testing experiences. For the most part, larger organizations are utilising QA software to provide more accurate metrics, and there has definitely been an improvement in terms of QA reporting. However, in Australia, what we are still not seeing is reuse of these test metrics after the initial reports have been released, and review of these test metrics post implementation of applications.

While organizations claim that they have confidence in their QA metrics, a quarter of respondents still struggle to prove that testing delivers business value, and only 20% indicate that their QA activities are strongly aligned with the company's business goals. This is relatively low compared with other parts of the world. Where Australia seems to fall short is in the validation of requirements. Requirements are being gathered in-house by internal subject matter experts (SMEs) rather than developed by independent resources.

In Australia, more than 80% of Test Data Management is handled internally, with 20% engaging third-party organizations for delivery. The main requirement is for test data to successfully integrate with the testing tools, and the key focus is on improving the accuracy of test data created.

We are also seeing a slightly slower adoption of cloud computing in Australia – as compared to the UK or North America, with only 40% of respondents suggesting that their companies are migrating to the cloud. The main reason for the slower adoption is the perception of both poor application availability and slower performance when

deployed on the cloud. Other reasons include a concern that the cloud is not easily customizable and that integrating cloud-based and internally hosted systems would be a problem. An additional barrier of entry is that many Australian organizations have already purchased testing tools as perpetual licenses. Therefore, repurchase of a cloud solution is not seen as a cost-effective option. Areas where testing on the cloud does appear to add significant value are performance testing and ad-hoc projects – as opposed to ongoing work programs.

For organizations that are using cloud technology, the main reason for the adoption is the ease of use, lower cost of ownership, and the cloud's ability to deliver a specific business requirement. The survey results also show that cloud adoption is more prevalent in organizations using non-critical applications and standard office applications – as opposed to business-critical applications.

Australia's approach to QA and testing is rapidly catching up with the rest of the world. In 2011, we are already seeing a less conservative approach to testing, as more organizations adopt the cloud and offshore options, and as the exposure and importance of QA within Australian organizations continue to increase.

We believe that companies in Australia will invest further in testing resources in 2011 to ensure that the quality of applications meets expected business outcomes. With the increased demand for testing resources over the next 12 months, and limited testing resources onshore in Australia, more organizations are likely to move to the more cost-effective option of offshoring to India and other Asian countries. These new offshoring practices, however, are going to require stronger communication and better reporting between third-party providers and onsite QA resources.

BRAZIL

By *Sérgio Pagani Carvalho*, Global Testing Services, Brazil, Capgemini/CPM Braxis



Brazil is a fast-growing market, currently positioned as the eighth largest economy in the world, but analysts estimate that it will soon become the fifth largest global economy.³ The reasons for the growth of the Brazilian market are varied:

- Strong inward investment – Brazil is the third preferred host economy for Foreign Direct Investments for the 2010-2012 period⁴
- Significant projected investment in infrastructure due to World Cup and Olympics bids⁵
- Large-scale government initiatives and funding opportunities from the Brazilian Development Bank⁶
- Social changes such as falling poverty, record job creation, a new middle class, and increased consumer spending

Key sectors that are fueling and benefiting from this growth are Telecoms, with major investment in broadband Internet access and Pay TV; Financial Services with increasingly sophisticated solutions to support operations; and Utilities with significant investment in generation capacity and smart grids in the next few years.

Top Trends

- QA budgets increase
- Adoption of cloud environment on the rise
- Movement towards specialization in testing and methods

This general expansion and investment is heavily supported by enterprise IT, which in itself is growing more than the economy in general; its growth is predicted to be more than twice that of the country's projected GDP growth in 2011. Some sectors with high levels of automation such as Telco and Financial Services are heavily dependent on IT as an enabler for driving revenue and delivering new products and

³ Propostas da Indústria Brasileira de Software e Serviços de TI – IBSS; O Valor Estratégico de Tecnologia da informação, August 2010

⁴ United Nation Conference on Trade and Development, World Investment Report, 2010

⁵ Gartner Research Emerging Market Analysis: IT, Brazil, 2010 and Beyond. July 15, 2010

⁶ Brazilian Economy Outlook , Aug/Sept 2010, Brazilian Ministry of Finance

56%

OF THE SURVEY RESPONDENTS INDICATE THAT THEIR BUDGETS HAVE INCREASED FOR QA IN THE PAST TWO YEARS

technologies. This has resulted in IT taking a more prominent role in Brazilian organizations and a stronger focus on application development and maintenance – including testing.

Analysis of the Brazilian data shows that only 30% of testing jobs are subcontracted or outsourced, and only 30% of those are located outside the company. A major preference is to have testers very close to the business, together with a primary preference in nearshore for those looking to outsource their testing activities. This analysis indicates a view of a market in which, due to its maturity level, testing services are closely aligned with the end-users, and require constant interaction between the parties. Particular business requirements and a strong dependency on internal knowledge of applications also play a part in this tendency.

In addition to application development, which is a more mature market for outsourcing, security and performance testing are the primary activities that the Brazilian respondents are looking to outsource. Activities requiring more specialized skills are considered to be suitable for outsourcing to third parties, while activities closer to the business are executed preferably internally.

Our observation of the Brazilian market shows that testing is, in many cases, still rather immature. It is not often considered to be a specialized discipline, and structured testing methods are not widely used. But our survey shows a changing trend. More than 80% of respondents have plans to create a standardized TCOE, and 56% have increased their budgets for QA in the past two years (only 8% have decreased their testing budgets). Companies are also looking for external expertise to help define their testing strategies and build a more consistent and effective approach to application quality.

Turning to the impact of the cloud, 42% of respondents say that at least a portion of their applications are expected to move to the cloud over the next year. This shows a confidence and willingness of Brazilian companies to adopt the cloud. However, there are reservations. Apart from security, performance is one of the greatest inhibitors for moving applications to a cloud environment. Despite these factors, 40% of respondents claim that some critical systems are being moved to the cloud architecture. Security is an area where Brazilian companies are strongly centralized as compared with the international average (44% versus 27%), as decisions on security testing are made by security departments, usually independent from IT and QA. Overcoming the information security barrier will deliver excellent opportunities, and with more and more applications going to the cloud, structured and effective security testing is a must for serious players.

The Brazilian market is at a turning point for testing services. It has certainly matured over the last few years and the indications are that there is likely to be continuous growth in the years ahead, powered by major events, government incentives, and emerging new consumers. With a more competitive environment, the quality of products and services is becoming a key factor to success and the picture captured by this survey highlights some of the difficulties and weaknesses that organizations must address. Industry-specific expertise, coupled with strong testing methodology can make a significant difference and help ensure that enterprises realize tangible benefits from their testing activities. Overall, Brazil has many similarities with the other regions around the world. However, as the testing market in Brazil is following an evolutionary path, already well traveled by other geographies, there is plenty to learn and apply.

CHINA

By **George Wang**, VP Global Delivery Center,
China, Capgemini



The rise and growth of the Chinese economy has been big news around the world. Only 30 years ago, China was still a poor, developing country, opening its doors to the world and integrating into the global economy. Today, China is the world's second largest economy, and many experts predict that China will surpass the US within a decade and become the world's largest economy. It is now the world leader of industrial output such as machine building, textiles, petroleum, electronics, food processing, transportation equipment, and telecommunications equipment. Seen traditionally by many as mainly an export-focused economy, China has gone through a rapid modernization over the past decade and has emerged with very high potential and an attractive domestic market, highlighted by the increase of foreign investments, domestic entrepreneurship, and fast growth rate.

In this context, most of the companies that have reached a critical mass and maturity are embarking on IT rationalization and industrialization initiatives. The fact that China is becoming a preferred location as an alternative to India for IT outsourcing puts IT professionals in this country in high demand. In this year's *World Quality Report*, our research confirms for the first time that both China (14%) and Eastern Europe (11%) have surpassed India (9%) as the most preferred IT outsourcing location for global enterprises, even though India still dominates the global IT outsourcing market by far.

Although Chinese companies already rely on outsourcing for several IT domains and are quite mature in the design and development aspects of IT, the concept of professional QA and testing is still relatively new, and the outsourcing of the QA function as a managed testing service is still in its infancy. Most QA-related activities are performed mainly by a company's own employees or contractors based on staff augmentation models. Chinese companies follow a model of headcount-centric outsourcing as opposed to task- or function-oriented outsourcing. This model has proven to be problematic, as most companies do not have clearly defined testing processes, and QA is not conducted in a consistent or methodical way.

Top Trends

- Larger increase of QA budgets
- One of the fastest adopters of cloud infrastructure
- Test outsourcing common with high market potential

82%

OF CHINESE COMPANIES PLAN TO SET UP A TCOE WITHIN THE NEXT TWO YEARS

Our research shows that test outsourcing is common and the market potential is high. As much as 94% of Chinese respondents have testers contracted or outsourced, although only 21% of respondents have more than 50% of their testing activities outsourced. Meanwhile, on average, 68% of the QA resources are still working in their own companies and only 32% of them are working from outside the company's main location. Corresponding to this fact, 94% of Chinese companies do not have an operational TCOE, indicating that the overall quality maturity is still years behind more mature markets.

Chinese companies are fully aware of their quality gaps and are especially sensitive to the Western perception of the country's manufacturing-related quality issues in the past years. Our report shows that Chinese companies are taking quality very seriously and are significantly increasing their budgets, with more than 83% of organizations confirming a large increase in QA budgets – the largest by far of any region in the world. Also, 82% of Chinese companies plan to set up a TCOE within the next two years, by either developing internally or using a third-party company with a TCOE capability.

Chinese companies are also showing interest in making investments in the latest technologies to help drive quality efficiencies and improvements. In order to improve the accuracy of test data and shorten time to provision data, most Chinese companies are looking to implement a TDM solution and are looking for external expertise for help. Nearly half of Chinese companies prefer to deploy their TDM solution on-site with the engagement of a third party. Learning from early adopters in other regions, Chinese organizations have specific expectations from a robust TDM solution in terms of integrating with other testing tools and the ETL tools.

Chinese companies are showing great interest in cloud computing – with the highest expected adoption rate in the world. As many as 99% of survey respondents confirm that they are planning to host or migrate some of their applications to the cloud over the next year – as compared to 81% for the rest of the world. In addition, 19% of Chinese companies are expecting to host or migrate more than half of their applications to the cloud over the next year – compared to only 10% for other geographies. Companies expect significant performance and security risks as they migrate to the cloud environment.

Application security is especially concerning to Chinese companies. They actively participate in application security assurance activities in many phases of the application lifecycle, including requirements definition, design, coding, and testing. The Information Security Team is normally considered to be the primary responsible party for application security, and one common way to ensure application security is through in-house audits. The challenge of doing security testing and auditing during QA falls on the interaction and collaboration between the QA, security, and development teams. As a result, technologies that can help improve the communication and collaboration between these teams are in high demand among Chinese companies surveyed.

In summary, China is at the cusp of a QA and testing industrialization and modernization phase. Most companies realize the need and benefits of a professional, structured, and industrialized quality practice. The government and private sectors are taking quality seriously, and new investments are coming in to bring in world-class quality best practices and advanced technologies such as TDM and cloud computing. We expect China's quality industrialization to mirror that of its fast-paced economy.

FRANCE

By *François Darphin*, Global Testing Services,
France, Sogeti



Top Trends

- *Testing activities growing faster than development and application management*
- *Outsourcing growing but mainly to nearshore or French-speaking countries*

Thanks to European and French regulations, the French economy has proven to be more resilient than many others during the recent economic crisis. The French industry sector which is more exposed to the international context remained stable, while the Public Sector, in alignment with the European stability pact, needed to reduce investments and find new budgets to provide for pensions and social security cover – two major French reforms of 2010. However, 2010 was a year of recovery for IT, with investments reverting to a growth trajectory in the main industry sectors: Banking and Insurance, Telcos, Retail, and Services.

According to La Fédération SYNTEC⁷ - a group that represents close to 80% of IT professionals in France - IT budgets will grow in 2011 from 3% to 8% of organizations' revenue, and the priorities of CIOs will be focused on new projects including infrastructure transformation using cloud, mobile solutions integration, service centers, and security. Many organizations are striving to achieve agile IT and to leverage it for new business opportunities.

In this context, the survey shows that testing activities are growing faster than development and application management (11% growth versus 9%) and demand is changing significantly from staff augmentation to more professionalized and externalized managed services. As a consequence, consulting demand is very strong for test process assessment, change management, and transformation governance. The CAC40 companies (the index for the 40 main companies in the French Stock Exchange) have dedicated testing teams or use third-party providers with dedicated resources. The consequences of the typical French organization split between the "think" part (AMOA in French) and the "solution" part (AMOE in French) is that the design, build, and run stages of an application achieve a better quality due to the independence of the two parts, but require a larger testing effort due to redundancies.

⁷ La Fédération SYNTEC represents close to 1,250 groups and French companies specializing in engineering, IT services, consulting, and professional training.

90%

OF THE SURVEY RESPONDENTS INDICATE THAT THEY USE CONTRACTORS OR THIRD-PARTY PROVIDERS FOR A PORTION OF THEIR QA ACTIVITIES

The data from French company respondents in this year's *World Quality Report* indicates that French organizations now recognize that they have to invest more in testing to optimize the overall efficiency of testing activities. Today, QA tasks are carried out primarily manually and by non-specialists. However, this tendency will likely change in the near future, with companies of all sizes increasing their QA budgets. Using a standardized and industrialized Testing Center is now the new rule. TCOEs are becoming more common, as well as sharing multi-user licenses. This helps explain why France uses fewer perpetual licenses (11%) than other parts of the world, such as the US (40%).

In order to reduce costs, French companies are accessing offshore resources from their own subsidiaries or from European-based partners. Over 90% of the survey respondents from France indicate that they use contractors or third-party providers for a portion of their QA activities. French regulations dictate that the French language must be used for French users, and European data protection rules only permit private data exchanges within Europe or countries with the same level of control. This limits offshoring possibilities to India, and therefore French companies prefer nearshoring to Poland and Morocco, or further afield to Mauritius or Vietnam. Teams in general, including testing teams, are more and more geographically distributed, and the demand for collaborative tools is strong.

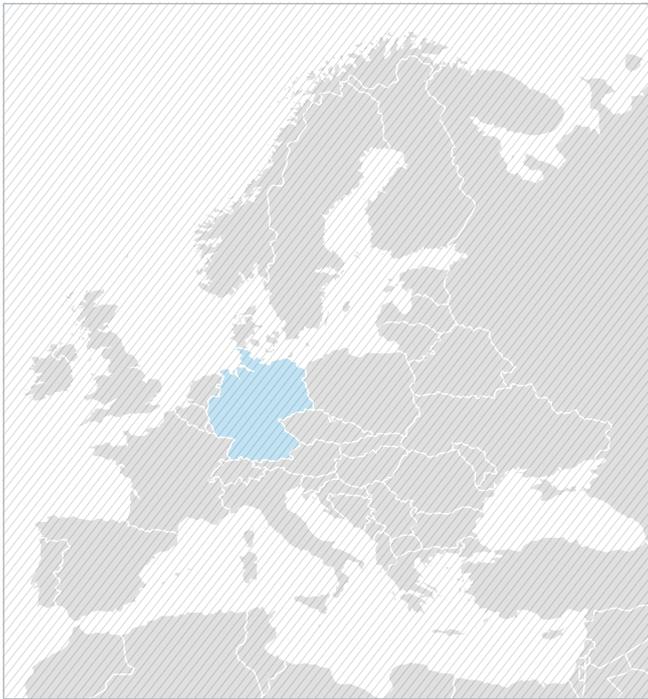
Test data and test environment management are common concerns of all organizations, with or without a TCOE. This creates a strong demand for tools to secure software content, packaging, and deployment. Cloud testing is in its early stages in this respect, but viewed as a good solution with demand for SaaS for tools (only 11% of French companies indicate they do not purchase tools through SaaS solutions compared to 29% for the rest of the world) and dynamic test environments or test lab provisioning. The preferred choice is a private cloud to comply with French regulations for data hosting and security.

Moving Forward...

- **New Comprehensive Testing Model:** Now that many French companies have created their own Test Centers and have used specialist providers for staff augmentation, they are looking for committed partners to achieve higher quality standards and cost reduction. This will stimulate further growth in demand for managed testing services, based on quality SLAs, fixed units of work, service centers, and externalization of test execution. This will change the traditional supplier offer of a “third-party acceptance test” model to a more comprehensive package consisting of methodologies, services, tools, and end-to-end services.
- **A different way of consuming testing services:** Customers are now asking for recurring activities, together with active knowledge capitalization, on-demand services, and licenses with a “pay per use” model.
- **Quality improvement – a new driver for governance:** Many French companies are changing their mindsets, processes, and tools to attain the required quality levels. Stakeholders, organizational business units, and providers all need to work more collaboratively rather than devolving responsibility. The concept of “Quality of Service” is now driving testing activities as the best means of optimizing the balance between the often conflicting priorities of time-to-market, quality, and cost.
- **Re-using versus re-doing:** All companies are looking to leverage existing testing assets and increase automation. The objective is to accelerate the overall test process, including the test design phase.

GERMANY

By *Stefan Gerstner*, Global Testing Services, Germany, Sogeti



Top Trends

- *Co-location preferred for outsourcing*
- *Main UAT responsibility still with end-users*
- *High levels of QA automation*

Germany is known as one of the leading nations in industrialized production. One of the best examples of this is the automotive industry, where a high degree of automation goes hand-in-hand with high flexibility with respect to individual client requirements at optimized cost levels.

Industrialization is now also reaching the German IT industry. The continued success of German companies increasingly depends on their ability to quickly introduce IT-based innovations at competitive cost levels. This in return raises the pressure on IT departments to streamline their processes and increase the use of specialized IT service providers.

A companion report, the Capgemini Germany study, “IT Trends 2011⁸”, reveals that today the average German IT department provides 50% of its own IT services. In comparison, leading companies with more industrialized IT departments have reduced the volume of services provided by their own departments to 15% or 20%. The study also shows that German companies have a preference to outsource services to Central European or nearshore locations rather than to offshore locations such as India or China. Our study confirms these findings.

Compared to other countries, German companies have a lower percentage of testers working at a nearshore or offshore location outside the company’s main offices. Over 40% of test resources are located within their own office facilities, while nearly half (47%) of respondents have between 1% and 25% of their testers in nearshore and offshore locations. Only 12% of respondents have between 26% and 50% of test resources abroad, and none above 76%.

⁸ IT-Trends 2011 – a study of the changes in IT and its impact on different industries, published by Capgemini Germany February 16, 2011. <http://www.de.capgemini.com/insights/it-trends/>

48%

OF THE SURVEY RESPONDENTS
PREFER CONTRACTORS TO BE
CO-LOCATED WITH THEIR OWN
EMPLOYEES

The average of all other countries has more than double the amount of testers abroad. The reasons for these differences are partly language issues, since a majority of companies work in a German language environment and there is no indication that this will change. It also reflects the fact that German companies have large IT departments and use IT service providers primarily for getting access to specialized resources. The answers regarding the ideal geographical location to contract and/or outsource testing activities also confirm these findings. Almost half (48%) of German respondents prefer contractors co-located with their own employees. This is nearly double that of the international average. For 11% of respondents, Eastern Europe is the highest-ranked outsourcing location, while India and China are rated significantly lower than the international average.

In this context, the pattern regarding the organization of User Acceptance Testing (UAT) is also interesting. The majority (63%) of German companies place the responsibility for this service with the end-user – significantly more than the international average (48%). Only 36% of QA resources play a minor role in UAT compared to survey results from other parts of the world.

On the other hand, German companies are rather more advanced in their use of automated testing. An overwhelming majority (90%) of respondents use automated test execution for more than half of their work. This is 13% higher than the international average. Our interpretation is that the technical preconditions for a more industrialized approach to testing are in place but just not being used to the full extent, because of a limited influence of the QA role within German organizations.

The approach of German companies towards cloud computing also seems to be more cautious compared to other countries. The vast majority of respondents (67%) expect that only a quarter of their applications will be hosted or migrated to the cloud over the next year, while the international majority expects to host or migrate 50% or more of their applications to the cloud. This careful attitude is confirmed by the clear preference for standard office applications (mail, agenda, word processing, etc.) as typical candidates for cloud computing – over half (52%) of German respondents favor this option compared to 33% for business-critical systems.

Overall, the analysis of respondent data from Germany indicates that German companies have established a stable if moderate starting position from which to apply a more industrialized approach towards testing. Reference to the proven benefits of standardized and automated production in general should help to communicate advantages of industrialized testing. We believe that making better use of specialized testing resources and global sourcing offer German enterprises interesting savings potential, as well as freeing up their own resources for innovations which is becoming increasingly important.

THE NETHERLANDS

By *Julien Bensaid*, Global Testing Services,
The Netherlands, Capgemini



Top Trends

- *High maturity level of Dutch QA profession remains stable*
- *Very mature approach towards metrics and automation*
- *Interest in SaaS and Cloud likely to accelerate*

The Netherlands has a broad and strengthening economy with services accounting for more than half of the national income, including Transportation and Distribution, Banking and Insurance, as well as industrial activity, particularly in oil, gas, and chemicals. With a relatively small domestic market, the Dutch economy is traditionally characterized by international trade, and all major commercial sectors are now present in the Dutch economy. Following the global slowdown, recent Dutch government statistics⁹ indicate that the economy in the Netherlands is improving and has recently crossed over to the positive side of the balance.

IT within the Netherlands is mature and, although Dutch enterprises generally exercise tight cost discipline, it is more often considered to be of value or even essential to business rather than an overhead. The increasingly professional procurement practices tend to commoditize IT services, in turn demanding increasing innovation and maturity from suppliers. This approach is adopted by an active Dutch government in its procurement as well as the private sector.

Together with North America, the Netherlands has, in many ways, led the innovation of the testing discipline over the past few decades – a combination of demand-side pressures (particularly the Finance and Telco sectors) and supply-side recognition of the specialization and the value of testing. The roots of testing trace back to the early eighties with the first major publications – including Capgemini Netherlands' own Structured Testing of Information Systems and of course Sogeti Netherlands' own Test Management approach, TMap® – appearing in the early nineties.¹⁰ Testing, in short, is an established profession in the Netherlands and this is demonstrated by the Dutch data within this survey.

⁹ Dutch Government's Central Bureau for Statistics (CBS), March 2011
<http://www.cbs.nl/en-GB/menu/themas/dossiers/conjunctuur/publicaties/conjunctuurbericht/inhoud/conjunctuurklok/conjunctuurklok2.htm>

¹⁰ <http://www.tmap.net>

73%

OF THE SURVEY RESPONDENTS
USE FORMAL METHODS IN
ESTIMATING THE QA EFFORT

Dutch enterprises have a relatively high percentage (compared to the worldwide average) of their own testers working at a location outside the company's main offices – only 34% of respondents indicate that their test resources are located within their own office facilities. Nearly a third (31%) of respondents have between 1% and 25% of their testers in nearshore and offshore locations. A smaller percentage of respondents (13%) have between 26% and 50% of test resources abroad, and a surprising 21% of respondents have over half of their testing resources abroad. We believe that this is explained by the fact that Dutch enterprises have a relatively small local market, so a significant focus is directed outside the national borders.

Dutch enterprises also show a strong local onsite preference (44%) when looking at the ideal geographical location for contracting and/or outsourcing testing activities. The other locations paint a very disparate picture: only 6% of respondents prefer Eastern Europe, 7% outsource to India, 4% of respondents prefer China, and nearly one in five (19%) of respondents prefer nearshore. The Netherlands is fairly in line with the international average for offshoring to India but clearly lags behind the international average displayed by many other regions, notably Eastern Europe and China, as well as the emerging regions such as Australia, South East Asia, and South America. This leads us to conclude that although (or perhaps because) the Netherlands still play a major role in the professionalization and development of the testing discipline, the Dutch appear to adopt a prudent approach to offshoring initiatives.

Where Dutch enterprises do outsource, they outsource one of the highest percentages of the testing strategy, as well as significantly higher than average functional, performance and UAT, indicating a high level of maturity in both outsourcing and offshoring. Significantly, 30% of Dutch enterprises have plans to create a standardized and industrialized TCOE, either on their own or through a third-party provider with the TCOE capability.

The percentage of budget allocated to testing (including testing processes, tools, and resource costs) has not changed much over the last two years. A small portion (6%) of respondents indicates that it has increased significantly and 16% of respondents indicate that it has decreased slightly. The majority of respondents suggest that it has mostly remained the same in this period.

A high level of sophistication is being exercised by many Dutch enterprises in estimating the QA effort required for a project (73% use formal methods), and in how they prove internally that their QA organization is delivering business value (84% have clear methods to support this). This perhaps goes hand-in-hand with the relatively high levels of automation (79% of respondents indicate that they use automation for more than a quarter of their testing). There is also a relatively high percentage of automated QA metrics collected in the Netherlands (almost 50%) compared to the global average of 30%. Again this is evidence of the strong focus on the professionalization of the discipline and focus on demonstrable ROI.

The approach of Dutch enterprises towards SaaS and cloud computing seems to be in line with other countries. One significant difference is in the perception of risk surrounding Interoperability, where the risk perception is significantly lower than many other countries and approximately half that of the international average.

Overall, the survey results indicate that Dutch enterprises have a relatively mature focus on QA and testing. The Netherlands may not be the clear leader in cutting-edge testing innovation, but there are plenty of highlights to be found in the levels of global sourcing, automation, and industrialization, as well as the high levels of sophistication, and the high-end test activities that can be outsourced. The future for QA and testing in the Netherlands seems to lie in the move to even higher levels of these aspects. Dutch enterprises will undoubtedly catch up with the leaders in testing in the cloud and Testing-as-a-Service (TaaS) delivery models, either individually or integrated into mature Managed Testing Services (MTS). This would satisfy both the testing suppliers' and the professionals' search for growth within this evolving IT discipline and the market's increasingly expert procurement practices.

THE NORDIC REGION

By *Mattias Bergströmner*, Global Testing Services, Sweden, Sogeti



Countries in the Nordic region (Denmark, Finland, Norway and Sweden) have been affected by the global crisis and its resulting recession, impacting a broad range of private sectors across the region, including Manufacturing, Telecoms, Energy and Utilities, Financial Services, and Consumer Products, as well as the Public Sector.

The Finnish economic downturn was mainly related to the collapse of its export market, while its Financial Services managed the crisis fairly well. The Danish economy was severely affected, exacerbated by a significant downturn of its real estate market, while its Financial Services were under great pressure, impacting the whole IT Industry.

For Norway and Sweden, the effect of the crisis has been somewhat different. Norway used its oil fund to stimulate various sectors such as Financial Services, which emerged from the crisis with little damage. Similarly, Sweden's state finances offered solid protection, so that the Public Sector and Financial Services maintained a more constant level of activity compared to other sectors.

Top Trends

- *High QA maturity mainly within larger companies*
- *Mixed maturity in applying automation*
- *Limited adoption of Cloud and SaaS*

The general perception of IT in the Nordics can be divided into two categories: those who look upon IT as a support function or cost center to the core business operations, and those who perceive IT as part of the core business itself and consider it to add value to the overall organizational performance. The latter approach is more prevalent in Norway, for example, where business and IT work closely together using Agile-type techniques. But elsewhere there are more significant gaps between business and IT. This is evident at the beginning (requirements process) as well as the end (UAT) of the application development lifecycle, where it often takes several iterations before IT and business are both on the same page.

Today, in the Nordic region, QA is well established in many major organizations, with a formalized test organization and supporting budgets, and is a recognized profession with dedicated resources. For smaller companies, however, the testing focus is much more erratic.

22% OF THE SURVEY RESPONDENTS SUGGEST THAT THEIR COMPANIES RUN BETWEEN 81-100% OF THEIR TESTS MANUALLY

Looking at the Nordic survey data, 33% of respondents indicate that budgets for testing and QA activities have stayed the same or have increased slightly (31%) over the last two years – in line with the global trend. This is a positive finding for the region, considering the recession. A small number of Swedish (16%), Norwegian (14%), and Danish (8%) respondents actually indicate a significant increase, whereas there is no such indication from Finnish respondents. Despite the relatively advanced nature of QA and testing in the region, 15% of respondents across the region report that they have no dedicated QA/testing budgets.

With regard to manual test execution, 22% of respondents from the Nordics suggest that their companies run between 81-100% of their tests manually. A good indication of the mixed maturity level in this area is the fact that 19% of respondents say that only a small portion of their tests (0-10%) are conducted manually.

Over half (52%) of Nordics respondents say that none of their software licenses are consumed through a SaaS model – compared to 27% across the rest of Europe and the US, suggesting that the Nordic companies prefer to purchase licenses for unlimited use.

Regarding collecting, sharing, and presenting QA metrics, there is only a 2% difference in the Nordics between those who say that they manually collect and present data with Excel (25%) and those who collect it automatically (23%). This is followed by 24% who do not do this consistently.

Measurement of metrics is an important factor in being able to prove that a QA organization is delivering business value. Nordic countries appear to be more aligned with the business goals compared to other countries that quantify defects in terms of financial liability. Half of Nordic region respondents feel that metrics, when used accurately, provide a measure for the success of the QA function. A third of the region's survey participants also indicate that metrics are something that they continuously struggle with.

On the subject of hosting or migrating applications to the cloud over the next year, 20% of Nordic respondents indicate plans for hosting between 11% and 25% of their applications in the cloud, which is smaller compared to the European average of 36%. Additionally, a quarter of European respondents also indicate that they will host between 26-50% of their applications on the cloud, compared to 13% in the Nordics. Over a third (35%) of Nordic organizations declare that they would not use the cloud, compared to 13% across Europe.

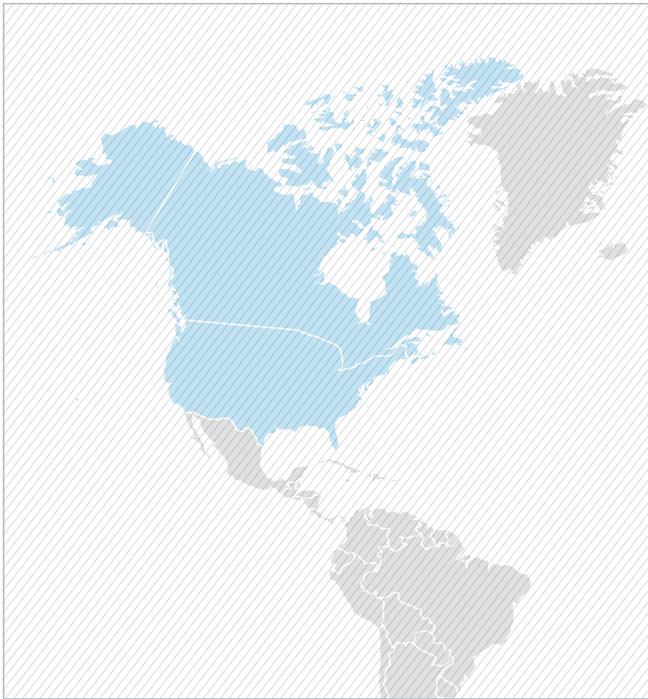
Based on the survey data, it appears that Nordic companies are not adopting new technologies as fast as the rest of Europe. One reason might be that the Nordic companies don't yet trust cloud solutions – which is evident by looking at the types of applications that they plan to host or migrate to the cloud in the next year. Most companies choose non-critical applications (43%) and standard applications (33%), followed by mission-critical applications (20%) and development and/or test environments (12%). The perceived risks for the cloud in the Nordics are consistent with the trends in other parts of the world: security (52%), performance (21%), availability (20%), and the threat that expected cost reductions would not be delivered (16%).

The Nordic region, to a varying extent, has been affected by the global crisis and, as usual, cost cutting has been a strong focus. With this in mind, and remembering the well-defined test organizations mentioned above, it is surprising to find that manual test execution is cited as being at a high level and that the degree of leveraging the SaaS-model and cloud-based hosting is rather low. These services would help cut costs at the bottom line.

We believe that the testing discipline in the Nordic region will continue to grow, but to meet future market demands, IT and the business must broaden their approach and realize that testing and QA work effectively at both strategic and operational levels. This will be key to achieving core values such as cost, delivery precision, and quality. Regrettably, this insight is often lacking, whereas it could provide a relatively quick route to efficiencies and profitability for many Nordic organizations.

NORTH AMERICA

By **Dan Hannigan**, VP, Testing Services, US, Sogeti and **Vineet Hans**, Testing Practice Head, Financial Services, NA, Capgemini



The economic crisis of recent years, ignited by the meltdown of the capital markets, has had a widespread impact across North American industries and regions. This illustrates just how interconnected the various sectors are, and how the impact of Wall Street can be felt on Main Street.

2010 ended with debt worries and questions about the future of the euro in Europe, doubts about the strength of the US recovery, and concerns about overheated economies and higher inflation in China and Latin America. Despite these uncertainties, the North American economy continues to improve, unemployment fell below 9%, and the IT market grew by 7.2%.

All the prevalent sectors in North America – Financial, Retail, Manufacturing, Energy and Utilities, and Government – have shown growth in IT spending. Organizations are looking at increasing revenue by introducing more products and engaging customers through new channels – such as mobile, Internet, and social media – and launching new programs to increase customer trust and loyalty.

Top Trends

- ↗ Increase in outsourcing on technology based work
- ↗ Despite cost reduction pressures, low levels of automation remain
- ↗ Budgets grow for standardized TCOEs

50%

OF THE ORGANIZATIONS USE CONTRACTORS OR THIRD-PARTY VENDORS TO OUTSOURCE THEIR TESTING FUNCTION

36%

OF RESPONDENTS SEE AN INCREASE IN THEIR IT TESTING BUDGETS TO MEET THE GROWING DEMAND FOR BETTER QUALITY

As the North American economy recovers, companies are directing IT investments not just towards enhancing their IT systems, but also to technology-led innovation to gain competitive edge and retain customer loyalty. Other factors such as regulatory changes in the Financial Services and Healthcare sectors are also leading to enhanced focus on IT. With all of these changes, the role of QA within companies is becoming more important than ever before to maintain brand image and customer loyalty, and to ensure a smooth ROI on IT investment programs.

Analysis of the North American data in this year's survey reveals that over 36% of North American organizations have seen some increase in their IT testing budgets to meet the growing demand for better quality. An increasing number of organizations are looking at setting up some form of standardized TCOE in order to optimize the cost of their services. Organizations are also using different sourcing models to operationalize their TCOEs, and almost 50% of the organizations use contractors or third-party vendors to outsource their testing function. Given the current high unemployment rate in North America, nearshore centers are gaining momentum, although India continues to be the preferred location for outsourcing with China being a close second.

The continued demand for IT professionals, specifically in the QA/testing space, has created a significant pressure on IT service providers to identify and hire additional resources to meet the demands of companies electing to Rightshore® or offshore their testing processes. This, in turn, has generated additional job opportunities in North America and has additionally increased the demand for capable offshore testing resources.

In the early days of outsourcing, the majority of work outsourced was around test execution; however that trend is changing. Over 50% of the organizations use their outsourced partners to provide more specialized testing work such as automation, performance, and security testing. There is still a lot of manual testing being done with almost 60% of organizations having achieved less than 25% automation. There is also an increasing trend in using third-party vendors for UAT, although most of the organizations still rely on their business users or internal QA resources for this important stage in the application development lifecycle.

Increasingly, QA organizations are tying their success to the business value that they are able to deliver. Over 50% of QA organizations link their metrics to the business goals or quantify their defects in terms of financial losses. Many internal QA organizations, while tying their success to business value, are also turning to the business to fund the QA department. This in turn increases the pressure on providing a successful software implementation, while at the same time having a business focus and justifying the implementation, development, and testing of software applications.

UNITED KINGDOM

By *Brian Shea, CEO, UK, Sogeti*



There is no doubt that fundamental changes are taking place in the United Kingdom at the present time. The UK is experiencing inflationary pressures while wage increases lag behind the leading indicators. Together with the increases in taxation and the cutting of public services and agencies, the market today is unsettled, but is beginning to find a stronger position from which to grow again.

Many of the large IT companies have entered into arrangements with the UK government to deliver cost reductions and savings at a time when other sectors, such as Financial Services, are expanding. Some companies are restructuring from a strong focus on the Public Sector to other sectors. IT Services companies, including those in the QA space, are finding that customers are demanding several things of suppliers:

- More experienced personnel to deliver projects
- Lower day rates charged for projects delivered
- Acceptance of more risk in the delivery of the project

The UK data has broad sector coverage and the responses reflect all levels of responsibilities in organizations. In a mature market, we would expect a common understanding of the issues organizations face in achieving and improving application quality. We also expect to see demonstrable take-up of new opportunities to increase quality and lower costs. Both of these are evident in the survey; however there are several surprises as well.

There is a very commonly held perception that outsourcing is mature in the UK and, while discussions and standard operating models for outsourcing exist, 23% of respondents indicate that they have not outsourced testing activities at all, and only 10% indicate that they outsource more than 51% of their testing activities. The maturity of the UK market and the impact of globalization are reflected in the amount of staff and testers (71%) working at locations other than their company's main offices.

Top Trends

- *Offshoring to China and Eastern Europe winning popularity over India*
- *Maturity consistently growing through TCOEs*
- *Large interest in cloud-based solutions*

94% OF THE SURVEY RESPONDENTS INDICATE THAT THEY WOULD BE SEEKING CLOUD-BASED SOLUTIONS TO DELIVER TESTING

The outsourced activities cover a full range of QA initiatives. In one of the unexpected conclusions of the survey, 14% of respondents say that they would like to see work outsourced to China, while only 13% prefer India. Considering the historical links between India and the UK, and the amount of work already outsourced to India, this is a surprising finding. Eastern Europe is preferred by 17% of respondents – again, this is not consistent with the common perception, given the longstanding links with India and the prevalent use of the English language in India.

In a further sign of maturity, the concept of the TCOE has come of age with (56%) of respondents indicating that a TCOE would be developed in the next two years, and 37% of responses indicating they are already building and managing this internally. This is consistent with the findings of the last two years where there were no major cuts to the quality of a company's capabilities and there were plans for further investment. The survey shows that 83% of respondents confirm budgets have remained stable or have even increased.

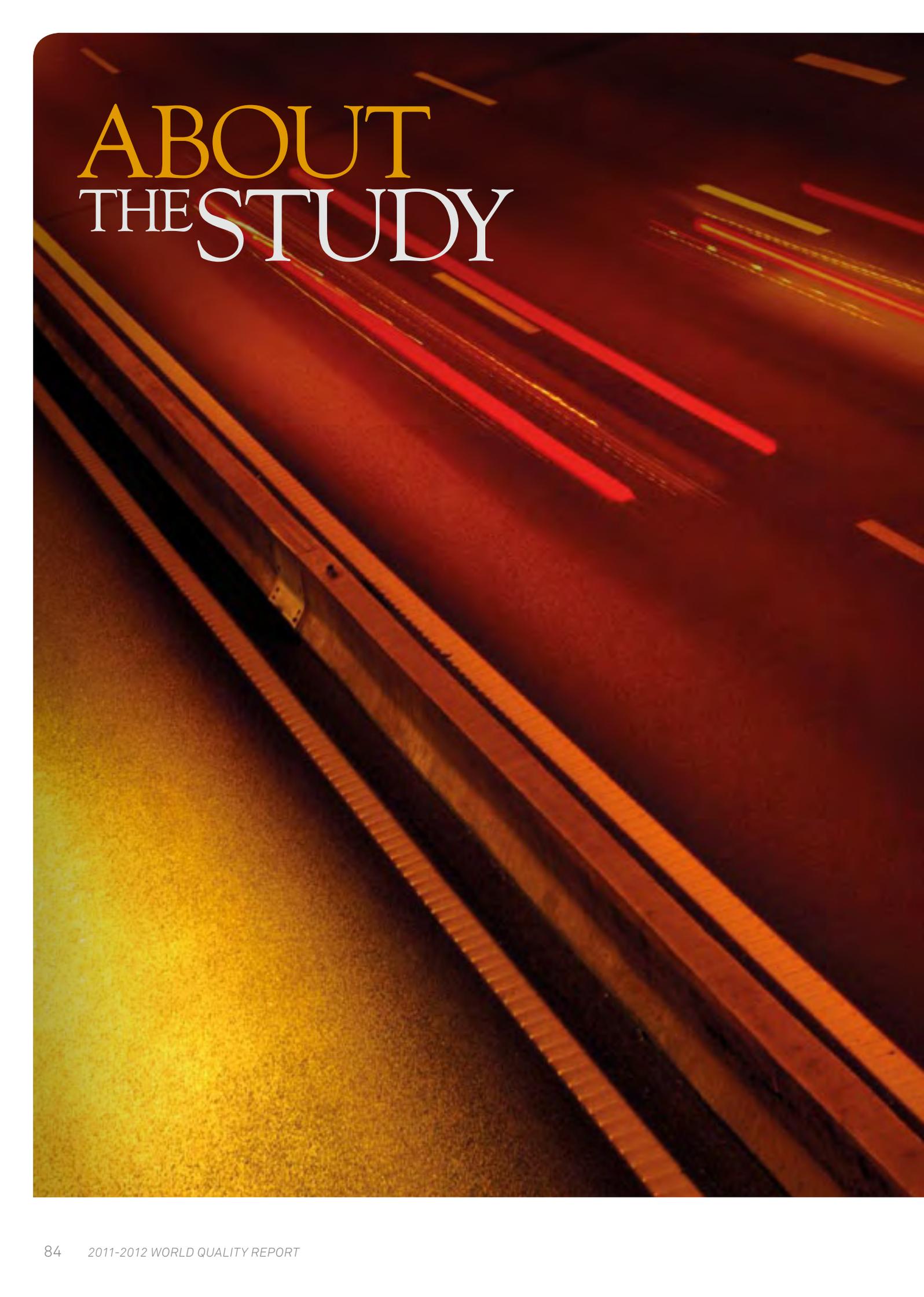
This maturity is further demonstrated in the quantification of quality. Three-quarters of respondents indicate that they consistently measure QA metrics across the entire company. Furthermore, 66% of respondents align metrics to business goals or quantify defects in terms of financial loss to prove that QA delivers business value. It is also recognized that there are sufficient environments provisioned in UK organizations to allow appropriate testing to be completed.

However, this maturity is not reflected in all parts of the quality function: 70% of companies that were surveyed use Excel as their main tool to collect, share, and present the metrics – as opposed to the many specially designed tools for recording and storing these metrics available in the market today. Similarly, the production of test data is not executed or managed in any consistent manner.

The survey highlights greater use of SaaS compared to last year. SaaS models were basically seen as “pay-as-you-use” software and there was no discernible difference between the numbers of people wanting to move further into that area and into the cloud. This year, there is marked growth in ambition to use the cloud for testing. In the UK, 94% of respondents indicate that they would be seeking cloud-based solutions to deliver testing. However, the ability to test utilizing the cloud is not well understood. Respondents are as aware of the inherent risks and issues as they are eager to innovate; all of which is consistent with a mature market. It is possible that the market sees the cloud as a cheaper alternative for SaaS, as opposed to a different model.

If some of the findings are viewed together, it can be inferred that UK organizations understand the benefit of investment in quality and are seeking further savings through additional investment. The level of investment and the tying of success in quality to success in the business serve to underline this observation.

It may be that, as in all trends, there are cyclical peaks and the UK may experience a period of slower growth in outsourcing work to locations beyond their own corporate offices. However with globalization, these corporate offices may well be in India, China, and other emerging markets. It does appear that UK-based organizations are seeking to generate further savings and expect to find them in one or all of three areas – the cloud, China, and evolving areas such as test data and test management tools.



ABOUT THE STUDY

Capgemini worked with FreshMinds, a UK-based research firm, to conduct the survey for the 2011-2012 *World Quality Report*. The survey was completed online by over 1,200 CEOs, CIOs, CFOs, IT directors and managers, and QA managers around the world. All major industries were represented in the survey:

- Consumer Products, Retail, and Distribution
- Energy and Utilities
- Financial Services
- Healthcare and Life Sciences
- High Tech
- Manufacturing
- Public Sector
- Telecommunications, Media, and Entertainment

Respondents come from a nearly equal number of small (1-499 employees), mid-size (500-4,999 employees); and large/enterprise companies (5,000-10,000+ employees), with 30% employed at small companies, 36% working for mid-size companies and 34% within large to enterprise companies (see Figure 35). While over a third of respondents

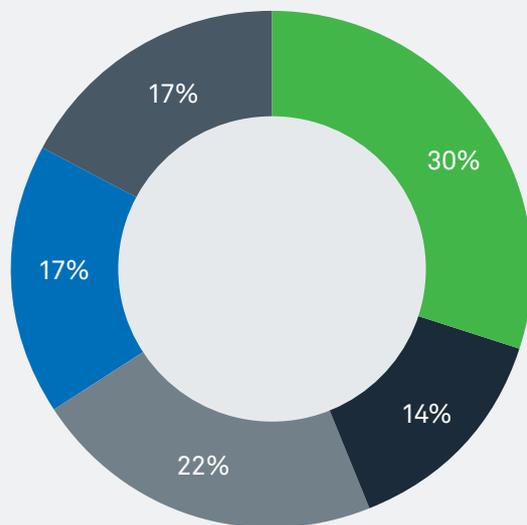
come from North America (39% between US and Canada), other regions are also well represented (see Figure 36).

In addition to the responses collected from survey participants, the content of this report is supported by Capgemini Group's benchmark data carried out on client projects, best practices, and over 40 years of experience in testing and quality management.

Throughout the years, Capgemini and Sogeti have developed a range of best practices, including TMap® and TPI®, which are now accepted as industry standards around the world. TMap® – Test Management Approach – is the Group's business-driven, risk-based methodology for structured software testing that is designed to address the key issues of quality, time and cost – across the whole development lifecycle of solution delivery. TPI® – Test Process Improvement – is the Group's registered model for the improvement of testing that offers insight into the maturity of the current test process and identifies improvement actions to accomplish the desired test maturity level.

FIGURE 35

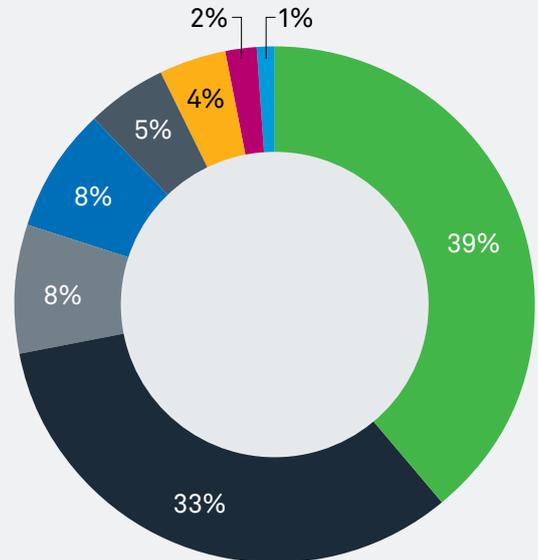
ORGANIZATION SIZES



- Between 1-499 employees
- Between 500 - 1,499 employees
- Between 1,500 - 4,999 employees
- Between 5,000 - 9,999 employees
- 10,000+ employees

FIGURE 36

REGIONAL REPRESENTATION



- North America
- Western Europe
- Australia
- China
- Brazil
- Other Europe
- Other Asia
- Other South America/ Latin America

About Us

Capgemini and Sogeti

The Capgemini Group is one of the world's foremost providers of consulting, technology and outsourcing services, enabling its clients to transform and perform through the use of technologies. Present in over 40 countries, the Capgemini Group reported 2010 global revenues of EUR 8.7 billion and employs over 112,000 people worldwide. Sogeti, its wholly-owned subsidiary, is a leading provider of local professional services, bringing together more than 20,000 professionals in 15 countries and is present in over 100 locations in Europe, the US and India.

Together, Capgemini and Sogeti have developed innovative, business-driven QA and testing services, combining best-in-breed testing methodologies (TMap® and TPI®) and the global delivery model, Rightshore®, to help organizations achieve their testing and QA goals. Capgemini and Sogeti have one of the largest dedicated testing practices in the world, with over 8,200 test professionals and a further 12,500 application specialists, notably through a common center of excellence with testing specialists developed in India.

More information is available at:
www.capgemini.com/testing
www.sogeti.com/testing

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Thank You

The authors would like to thank the team of collaborators who helped create this report.

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