A Forrester Consulting Thought Leadership Paper Commissioned By Riverbed

Forrester's Ideal Tool Set For Application Performance Management For Better Business Performance

Benchmark Data On Current State Of Application Availability And Performance Within The Enterprise

August 2013

FORRESTER®

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Executive Summary

In June 2013, Riverbed commissioned Forrester Consulting to evaluate the issues surrounding the management of IT transactions, applications, and business services.

In conducting a survey of 159 IT professionals with direct responsibility for business-critical applications, Forrester found that all enterprises surveyed had fundamental issues while managing the performance of these applications and business services.

Our survey shows that a majority (52%) of the IT operations surveyed waste more than 20% of their operational resources to track and correct problems and that application performance issues are a major cause of business productivity loss.

Each evolution of application technology and business services has brought another level of complexity and has increased the obsolescence of traditional IT management processes and tools, especially in the area of proactive performance management. Yet, numerous studies have directly linked business productivity, revenue, and client satisfaction with application performance. This emphasis on performance is reinforced by the current technology evolution: Smart devices, which are now ubiquitous in all facets of business services, also require application availability and fast response times.

Looking at the survey data shows a number of trends that make an ideal management solution: 1) the understanding of the customer experience; 2) the ability to model transaction dependencies on infrastructure components; 3) the ability to bring together data from all these components in a way that allows it to be shared by the issue investigation teams; and 4) the ability to rapidly identify the components at fault and the root cause of problems.

Key Findings

Forrester's study yielded the following key findings:

- **Lowering operational costs to achieve an efficient IT organization is a key objective.** Efficiency is defined as providing the expected quality of service while constantly reducing the budget.
- **Business service brownouts are the main factors affecting end user productivity.** Due to the lack of meaningful alerts and precise information on the root cause of application issues, time is wasted in IT, resources are consumed, users are impacted, and the business bottom line is directly affected.
- **IT professionals want proactive alerting and root-cause identification.** A complete solution that includes: 1) end user experience monitoring; 2) the ability to model applications; and 3) the monitoring of all components involved in delivering the business services is seen as the best approach to foster better and more effective cooperation between IT teams.
- **An end-to-end monitoring and management solution is the preferred choice.** Because of the breadth of coverage needed to answer the challenge of managing user transactions across IT operations and development teams, an end-to-end management model that uses analytics and a single dashboard to promote team cooperation is the solution of choice.

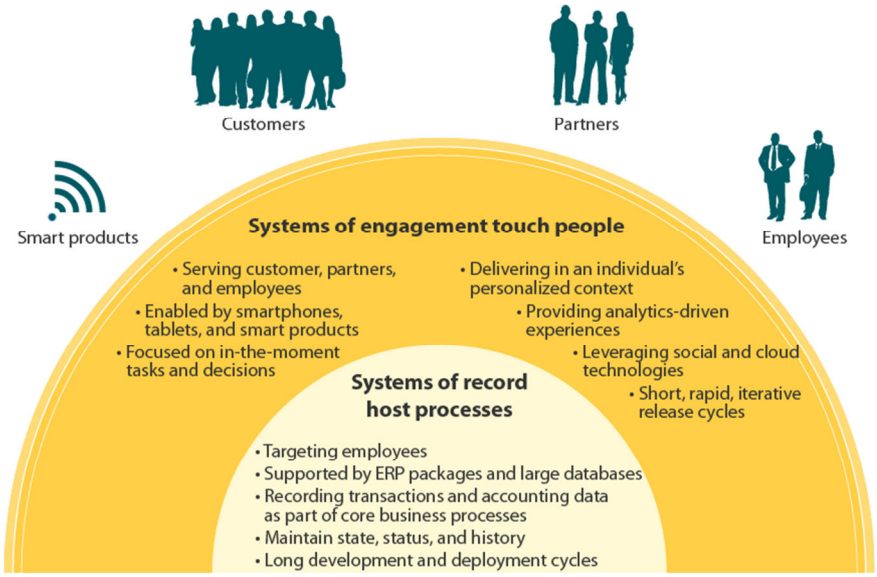
Achieving Business Goals Through A More Efficient IT

The exponential growth of technology and a constant reduction of hardware unit prices have brought fundamental changes in the way IT supports business interactions. The "traditional" IT which catered to the needs of the corporation by keeping the corporate house in order — what Forrester calls "systems of record" — is now supplemented by more and more applications that focus on facilitating the tasks of people: what we call "systems of engagement" (see Figure 1). This creates a fantastic increase in terms of transaction volumes as well as an added complexity due to the necessary connections between the two systems. The growth of systems of engagement is basically fueled by the need to increase productivity but mostly through innovative approaches to the business process: 54% of IT decision-makers surveyed support corporate initiatives to increase IT capacity in support of business innovations (see Figure 2).

IT infrastructure and business services, as well as the corresponding organizational structure, exist solely in any enterprise for the purpose of supporting business processes. This is not an easy feat. On one hand, the economic value of IT as a business tool requires more and more sophisticated functions that must be provided at a near constant level of service. On the other hand, the cost of delivering these functions has to be constantly reduced to maintain a competitive business value. Technology progress has so far played a major disruptive role that translates into increased complexity for IT operations professionals. IT is not only tasked with delivering current business services at the highest quality level and the lowest possible cost, it is also required to innovate and improve business services using new technologies such as smartphones, tablets, and BYOD (bring your own device).

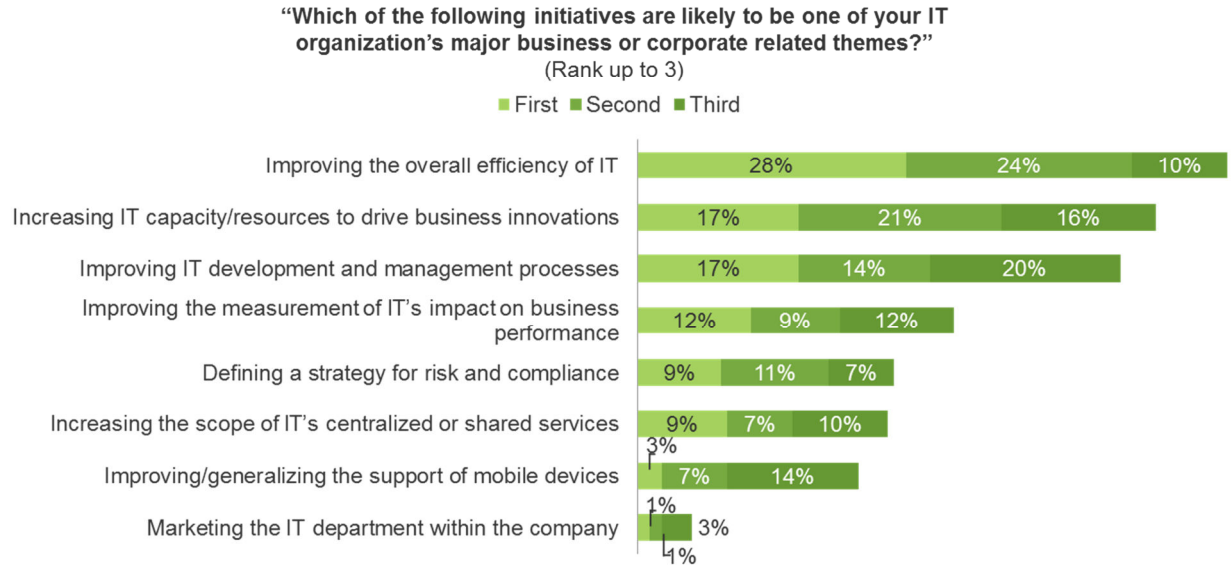
IT and its business partners now have to maintain a delicate balance between gains in user productivity through better services and increased cost of business revenue through additional IT resources. While business innovation through IT expansion is a key initiative, another important element for 62% of our survey respondents is to control the cost and quality of business services. In short, maintain an efficient IT.

Figure 1
Systems Of Records And Systems Of Engagement



Source: "Great Mobile Experiences Are Built On Systems Of Engagement," Forrester Research, Inc., November 16, 2012

Figure 2
IT Efficiency Is A Major Business And Corporate Objective

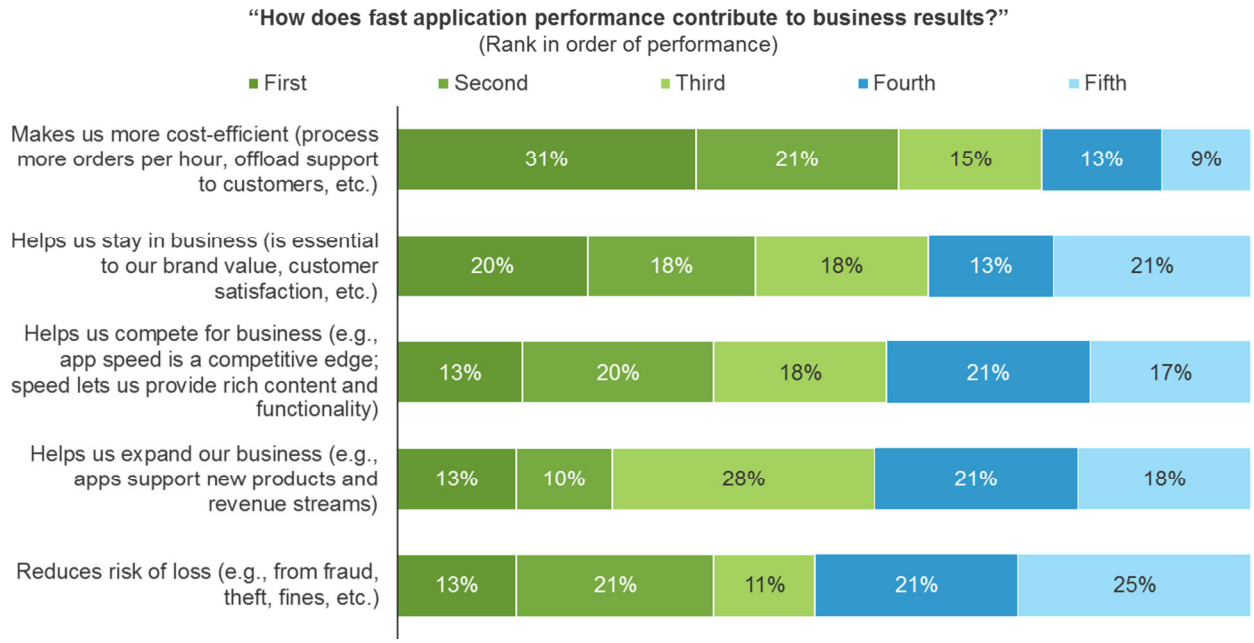


Base: 159 IT decision-makers at North American enterprises

Source: A commissioned study conducted by Forrester Consulting on behalf of Riverbed, June 2013

In this context, the performance of business services and their underlying applications and transactions is the key to end user (employees, partners, and clients) productivity. Application performance helps productivity by allowing more units of work to be processed within a given unit of time. It also reflects an image of effectiveness that helps enterprises create a competitive differentiator: Many studies have shown that a response time that keeps the end user engaged is the key to customer satisfaction and increased revenues (see Figure 3).[1]

Figure 3
The Importance Of Application Performance



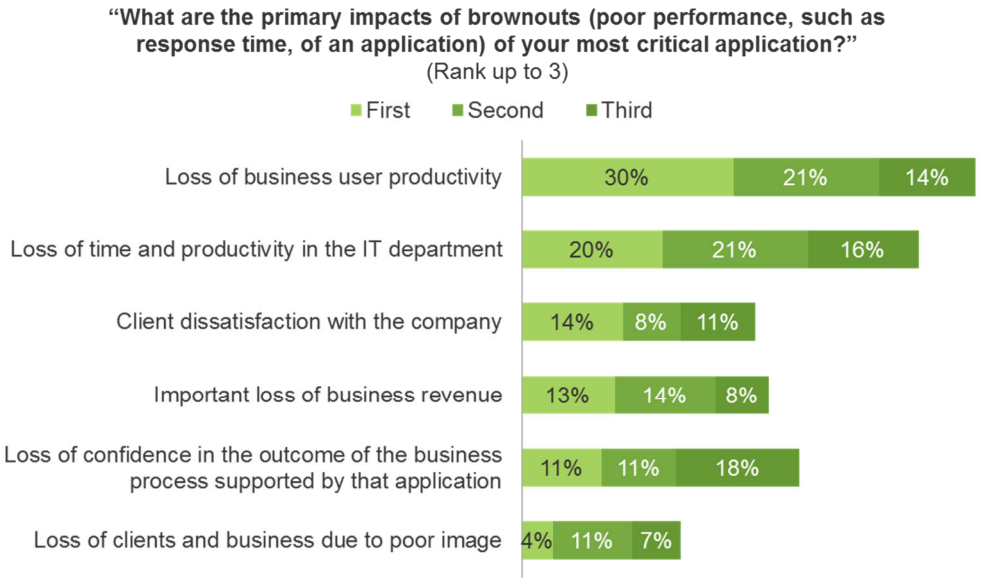
Base: 159 IT decision-makers at North American enterprises

Source: A commissioned study conducted by Forrester Consulting on behalf of Riverbed, June 2013

Application performance lapses have a strong impact on enterprise efficiency. Figure 4 illustrates the impact of poor transaction performance on the enterprise (see Figure 4):

- **Business productivity loss is of course the first consequence.** Thirty percent of respondents identify business user productivity loss as the major consequence of application performance issues.
- **IT productivity is most certainly impacted.** As unplanned resources need to be diverted to finding performance issues, normal tasks and projects have to be set aside.
- **Customer satisfaction is also jeopardized.** In any eCommerce activity, poor transaction performance reflects on the perceived value of the service and on the enterprise image. Revenue and customer loyalty are deeply affected.

Figure 4
Application Performance Issues Have A Ripple Effect



Base: 159 IT decision-makers at North American enterprises

Source: A commissioned study conducted by Forrester Consulting on behalf of Riverbed, June 2013

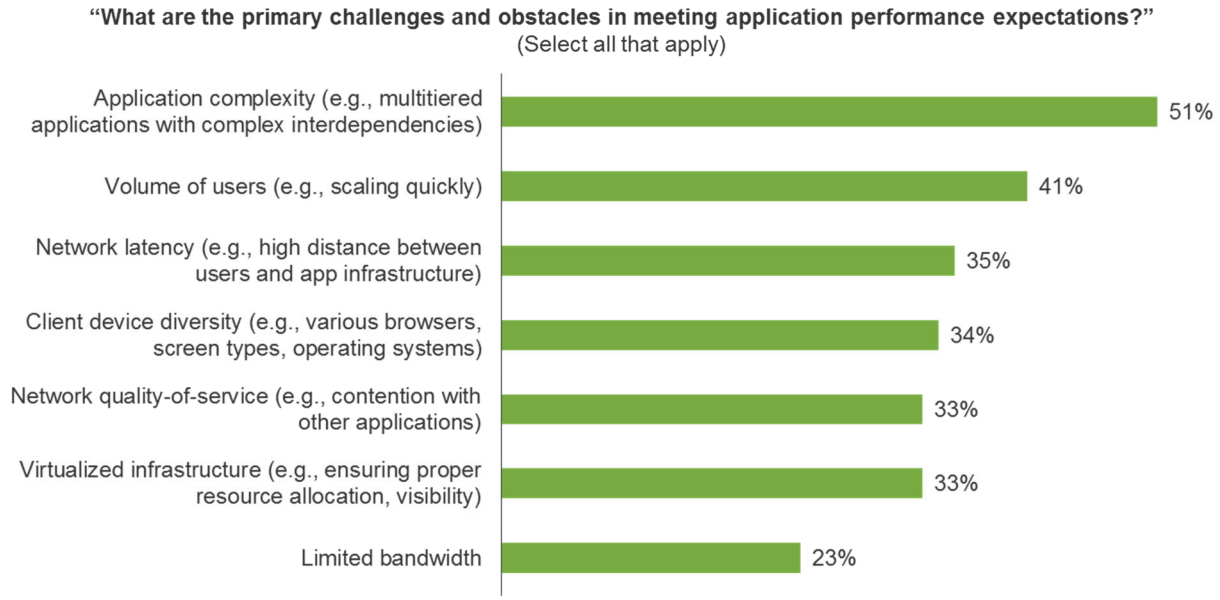
Application Performance Challenges

Technology evolution doubles the capacity and performance of components every two years, while the cost of these components decreases exponentially in the same amount of time. The consequence has been clearly stated by the late Watts Humphrey, who reached the conclusion a few years ago that software size is multiplied by 10 every five years, and in fact follows a corresponding exponential growth as hardware does. This has a direct impact on the complexity and number of potential problems in applications. For example, Watts Humphrey commented that if the development process does not evolve in parallel with the size of software, the ratio of errors per thousand of lines of code will tend to stay constant, meaning that the total number of errors in an application effectively doubles every two years.[2]

On top of this, the complexity created by new systems of engagement based on an increasingly powerful mobile technology becomes a major factor in applications and business service quality. A majority of respondents cited complexity as the primary cause of performance issues (51%), closely followed by the increase in online workload created by these complex applications (see Figure 5).

To alleviate this potential business service quality issue, many IT organizations rely on IT management software tools. 80% of respondents believe that software management tools are important or very important in managing application performance (see Figure 6).

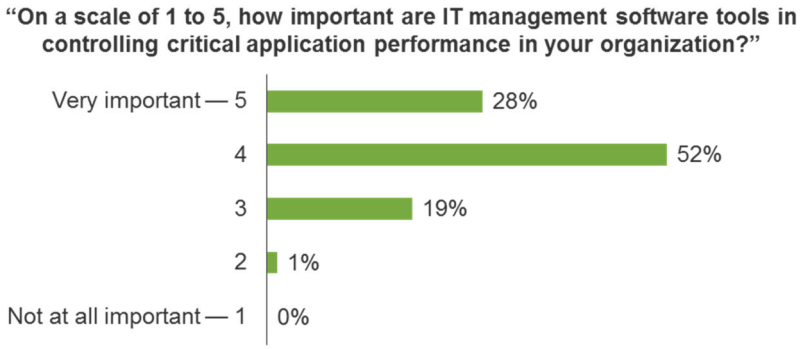
Figure 5
Challenges In Meeting Application Performance Expectations



Base: 159 IT decision-makers at North American enterprises

Source: A commissioned study conducted by Forrester Consulting on behalf of Riverbed, June 2013

Figure 6
Tools Are Key To Managing Application Performance

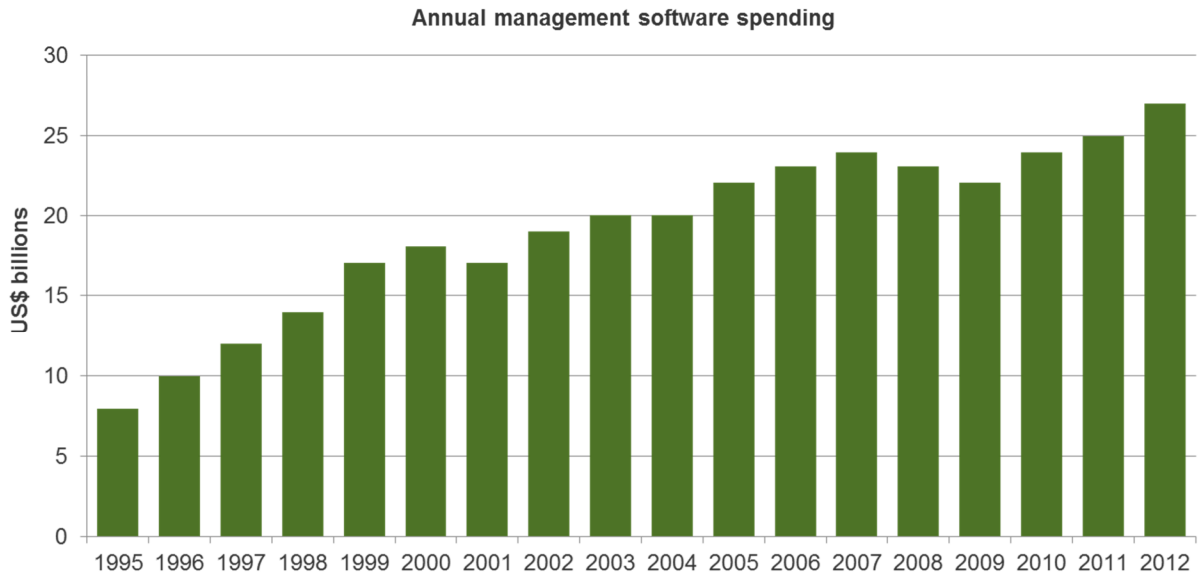


Base: 159 IT decision-makers at North American enterprises

Source: A commissioned study conducted by Forrester Consulting on behalf of Riverbed, June 2013

Enterprises invest vast amounts of money in management software tools. Over US$25 billion is spent annually on management software of different categories (see Figure 7).

Figure 7
So We Buy Tools



Source: Forrester Research, Inc.

But does this investment pay off?

Among the critical industrial processes, IT is probably the only one where control and management comes as an afterthought. Blame it on product vendors or on immature clients, but managing business services takes a back seat to developing critical functions aligned with business requirements. But as the application is actually the automation of a critical business process, service continuity deserves a priority level as high as the pure functional aspects. Issues with an application, whether born from development, capacity sizing, or configuration errors, show themselves in production. As these errors are related to specific parts of the service delivery engine, they tend not to show themselves at the same time; they appear haphazardly, as a consequence of the particular environment of a business process phase. This creates a business and IT crisis that needs to be resolved as quickly as possible to avoid productivity and business losses. There is consequently a rush to select a "magic bullet" that resolves the particular "problem du jour." As issues appear in one corner of the infrastructure, tools are acquired to cover that aspect, resulting in a proliferation of management solutions specifically oriented toward a particular "silo" of hardware or software technology. Enterprises end up in a situation where tools are not uniformly deployed on the infrastructure, and are used in technology competency silos, a situation that does not promote cooperation between IT groups (see Figure 8).

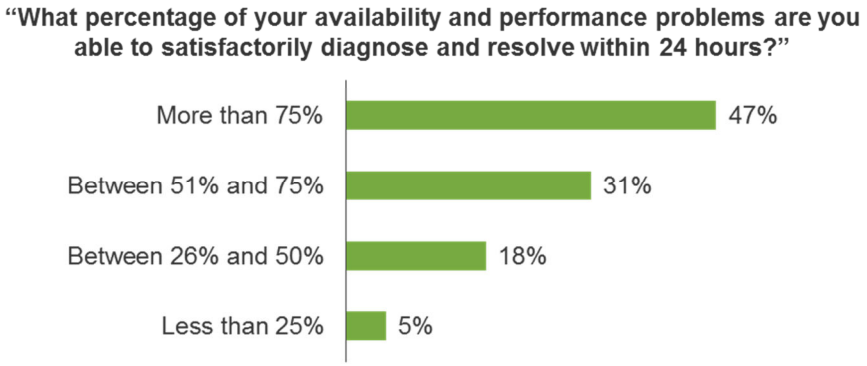
Figure 8
Management Tools Challenges

Base: 159 IT decision-makers at North American enterprises

Source: A commissioned study conducted by Forrester Consulting on behalf of Riverbed, June 2013

This multiplication of independent tools becomes a challenging proposition when teams are asked to cooperate and find a solution to a critical issue, or simply when trying to correlate data from different sources. Different tools reporting on different consoles, with no data normalization or time alignment between them, make it impossible to have a holistic view of problems, which results in the inability to resolve performance problems quickly enough to satisfy the business quality objectives. For 54% of respondents, IT is unable to resolve over 25% of complex issues in less than 24 hours (see Figure 9).

Figure 9
The Consequence Of IT Management Software Challenges

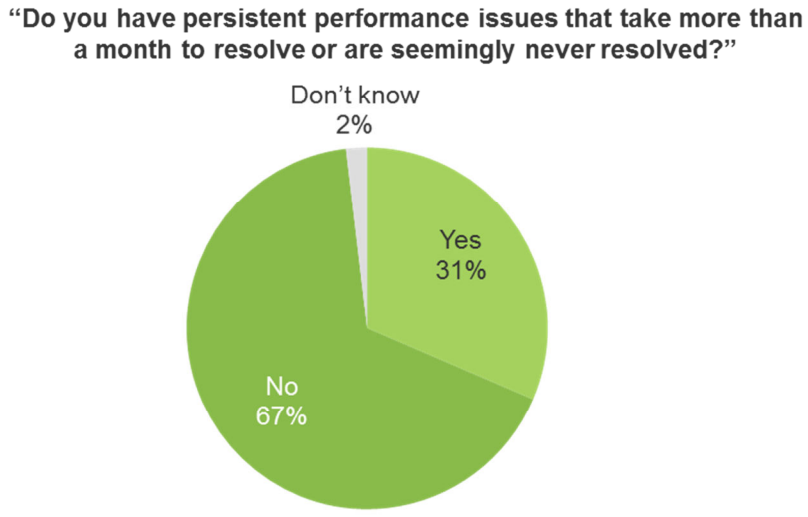


Base: 159 IT decision-makers at North American enterprises

Source: A commissioned study conducted by Forrester Consulting on behalf of Riverbed, June 2013

Even more disquieting, 31% of respondents said that they have performance issues that take more than a month to resolve or simply do not seem to go away (see Figure 10).

Figure 10
Persistent Performance Issues Are Common

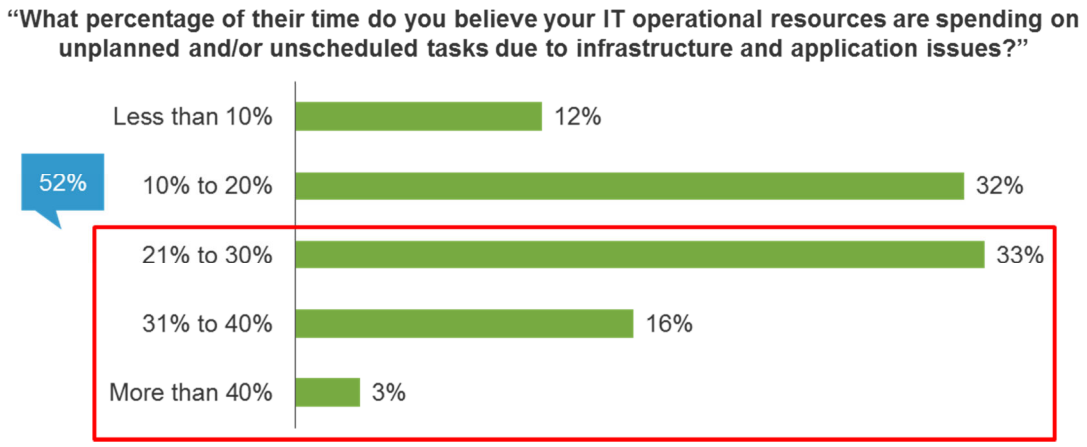


Base: 159 IT decision-makers at North American enterprises

Source: A commissioned study conducted by Forrester Consulting on behalf of Riverbed, June 2013

Our survey shows that 52% of the IT operations surveyed waste more that 20% of their operational resources to track and correct problems. On top of the business productivity loss and the damage to the brand, IT productivity suffers also from this state of affairs, as resources are called from their normal work to perform unplanned and unscheduled tasks. For IT, solving this or minimizing the waste of resources would result in a net gain of 20% of its workforce — an improvement that any VP of operations would welcome (see Figure 11).

Figure 11
IT Ops Waste Time On Unplanned And Unscheduled Application Issues



Base: 159 IT decision-makers at North American enterprises

Source: A commissioned study conducted by Forrester Consulting on behalf of Riverbed, June 2013

Finding A Better Management Solution

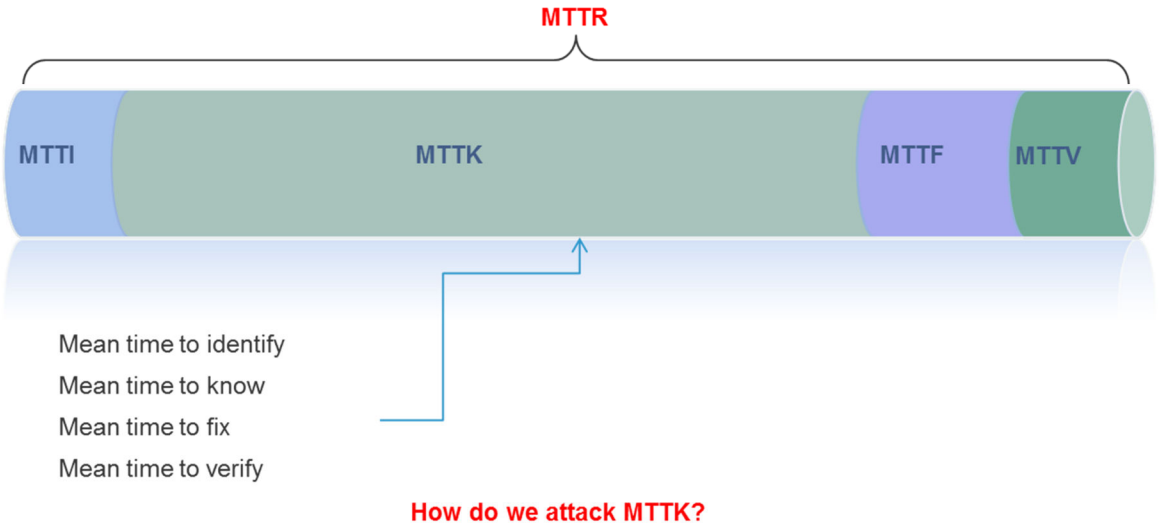
Application performance management is the capability to deliver service quality in this context. This does sound like the primary objective of system management and IT operations since the dawn of time (and it actually is) but management solutions have promised and failed many times to deliver on this goal.[3]

In a typical illustration of Zeno's paradox, application technologies forever precede management capabilities, and management solutions are most of the time aftermarket products purchased in a crisis reaction mode.[4]

The consequence is that most IT operations have become a collection of experts, each with a bag of tools — all independent and incompatible. As application architectures evolve exponentially in complexity, experts are facing increasingly complex situations that overwhelm the analytic abilities of any single person. While most of the information needed to effectively manage the new application architectures may be collected by many products on today's market, gathering several experts and manually aggregating data from multiple sources into a meaningful view of a business service is at best extremely painful, resource intensive, and usually a complete waste of time. To improve the situation, we must first analyze where time is wasted in resolving performance problems.

Mean time to repair (MTTR) is the measure of time taken to resolve issues. But MTTR itself can be divided into subphases such as the time to identify a problem (MTTI), the time to know where the issue resides (MTTK), the time to fix this issue (MTTF) and the time to verify that we have effectively resolved the problem (MTTV). A quick analysis shows that MTTK is the part where most time is wasted in the resolution process (see Figure 12).

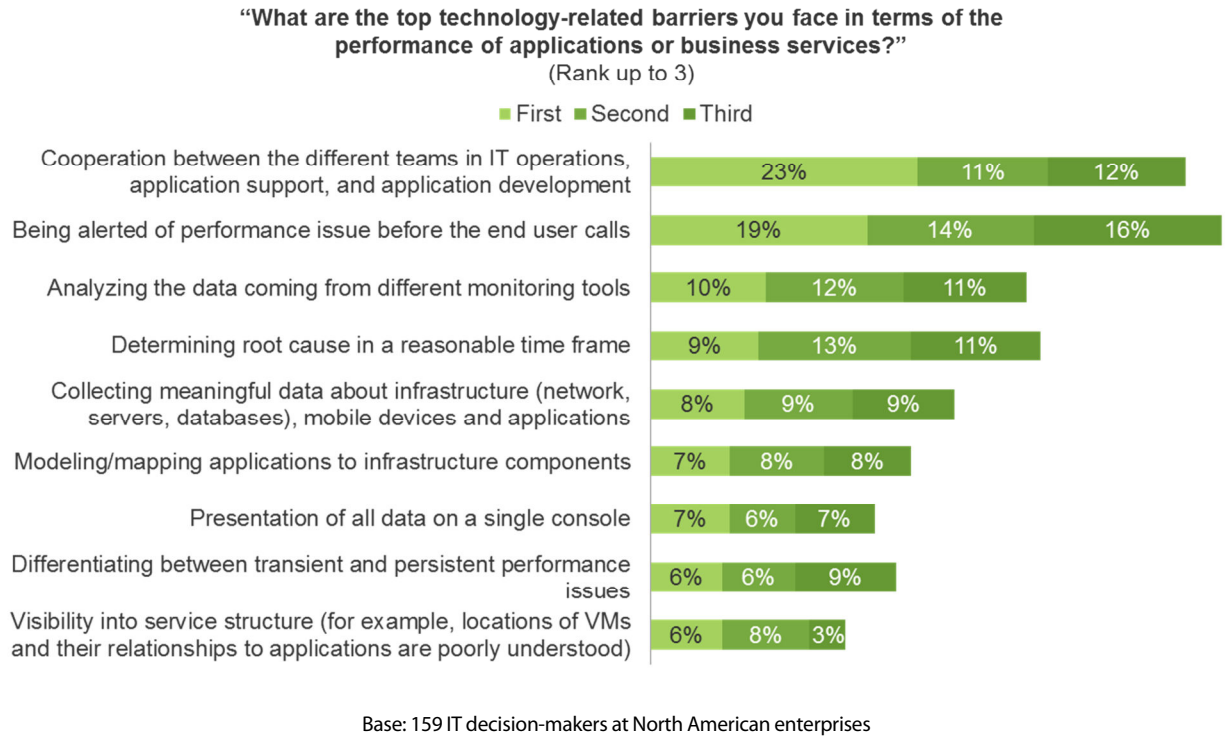
Figure 12
Where Do We Waste Time (And Money)?



Source: Forrester Research, Inc.

Forty-six percent of respondents believed that a reduction of MTTK resides in a better cooperation between teams, followed by a number of improvements in the tool set such as a better alerting on performance issues (49%), the capability to understand root cause by analyzing data coming from different collectors, the modeling and mapping of application dependencies on infrastructures, and the presentation of data on a single console (see Figure 13).

Figure 13
MTTK Reduction Is Based On Cooperation

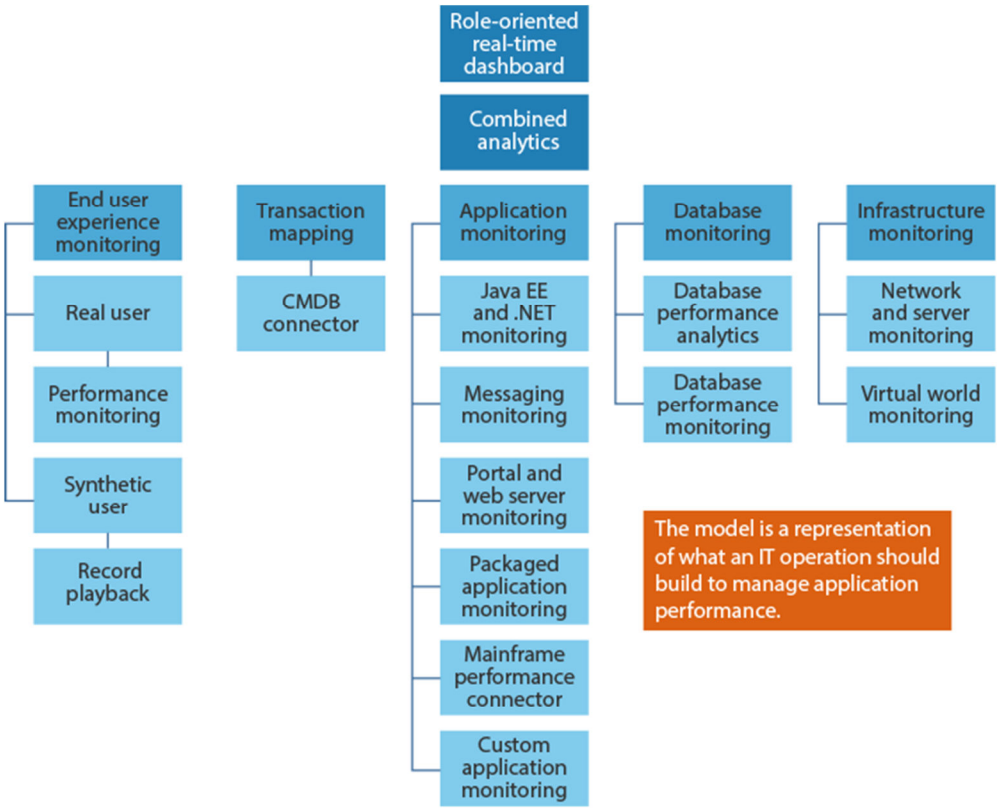


Base: 159 IT decision-makers at North American enterprises

Source: A commissioned study conducted by Forrester Consulting on behalf of Riverbed, June 2013

Forrester has taken all these obstacles to better resolution into account and has summarized them in an application performance management reference model that represents the ideal state of application performance monitoring (see Figure 14).

Figure 14
The Application Performance Management Reference Model



Source: "Realize Practical Application Performance Management," Forrester Research, Inc., February 27, 2013

The Forrester reference model shows what should be in an application performance management solution today and in the future, regardless of the underlying infrastructure. This reference model includes:

- **The ability to collect response times by transaction and to determine the first-level alerting criterion.** We believe that this is best achieved by using 1) a passive agent that provides real end user performance monitoring (RUM) and 2) an active agent that provides availability data.
- **The ability to understand and map all the components of the transaction.** Several solutions are possible, but we believe that this must be able to track each type of transaction and/or each transaction through the infrastructure, provide a template for debugging performance problems, and give full visibility into the transaction path. In addition, the recording of transactions and transaction context should be a key element of cooperation between IT operations and application support groups.
- **The monitoring of applications themselves.** This includes application servers, portal and web servers, connectors to collect performance data coming from mainframe-based transactions, messaging technologies between distributed systems and mainframes, packaged applications, and custom applications.

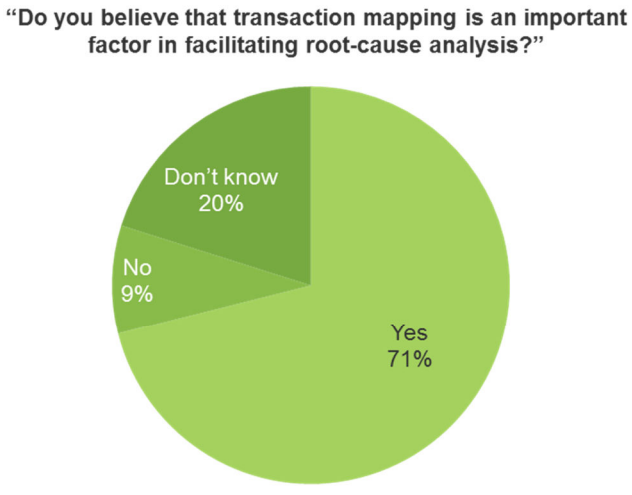
- **The performance monitoring of the database (s),** and the ability to analyze specific database performance issues.
- **The ability to monitor the physical and virtual components of the infrastructure.**
- **The ability to combine all these parameters together.** This leads to the ability to determine an alert, identify the root cause of this alert, and if possible predict an impending performance issue. This is based on an analysis of the problem using transaction mapping as a way to reduce the data sample on which this analysis takes place.
- **The ability to provide all this information on a "single pane of glass" dashboard.** This should be customized according to the role of the person using the dashboard.

The Forrester reference model is thus a guide that IT operations can use to: 1) evaluate their requirements; 2) perform a gap analysis between requirements and solutions already installed in operations; and 3) evaluate the different solutions available on the market.

The Importance Of Transaction Mapping

The transaction map describes all the components used in delivering a specific transaction and is a fundamental template that is used to reach a more effective problem resolution and impact analysis. Because they reduce the sample of information to be analyzed, transaction maps are the cornerstone of an integrated monitoring strategy, and this is clearly expressed by the respondents in this study: 71% stated that mapping or modeling transactions to infrastructure components is the key feature of an ideal management solution (see Figure 15).

Figure 15
Transaction Mapping Is Key To Root-Cause Analysis

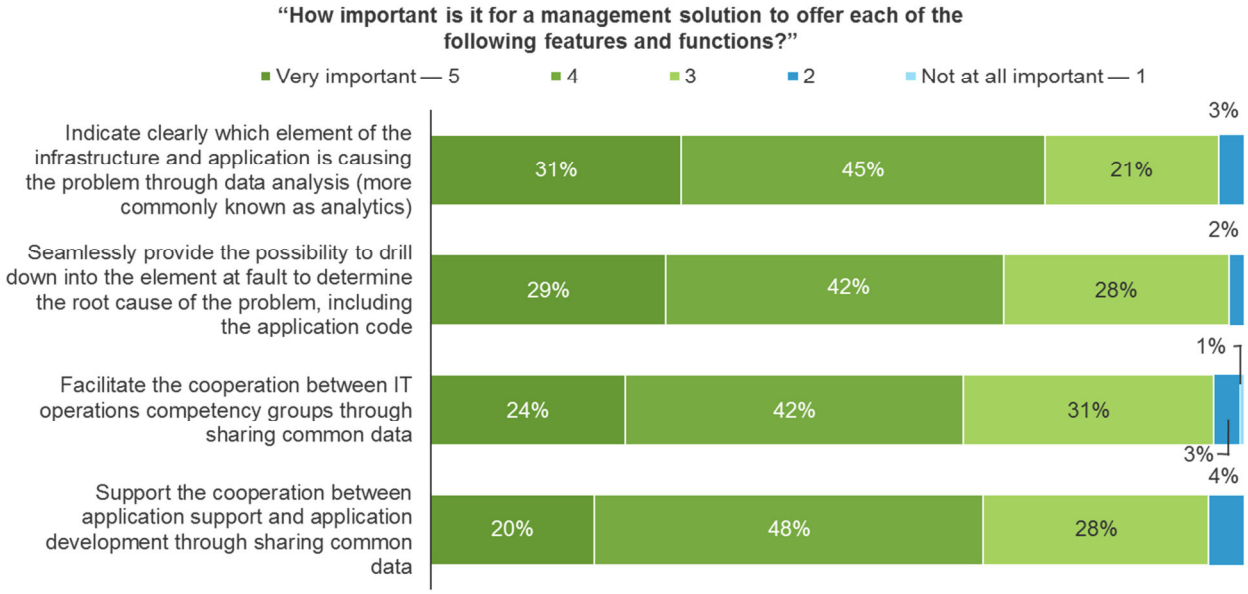


Base: 159 IT decision-makers at North American enterprises

Source: A commissioned study conducted by Forrester Consulting on behalf of Riverbed, June 2013

The complement to transaction mapping is the ability to collect data and events consistently across all components of the business service or application. This provides complete visibility and the ability for teams to share the same data and eventually effectively cooperate within a single "source of truth" (see Figure 16).

Figure 16
A Single Source Of Consistent Data Is The Ideal Complement To Application Models



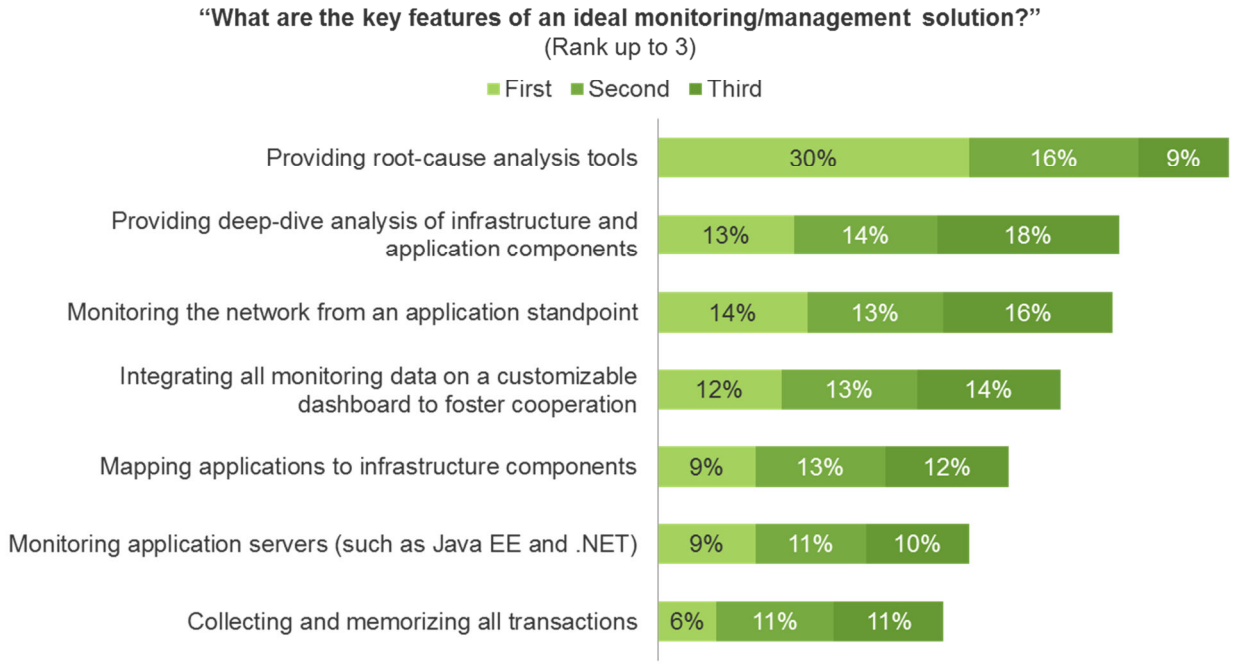
Base: 159 IT decision-makers at North American enterprises

Source: A commissioned study conducted by Forrester Consulting on behalf of Riverbed, June 2013

As technology growth shows no sign of slowing down in the coming years, an onslaught of demand is on the IT horizon. The challenge of the next five years calls for a different approach to the increased complexity of the future data center. As business requirements have escalated, generations of technology have been implemented to try and stem the tide. The result: data centers characterized by complex, static physical configurations, incomplete virtualization efforts, and multiple silos of management. Public and private clouds as well as potential business-driven software-as-a-service (SaaS) applications will add an order of magnitude to this overwhelmingly complex environment. The only solution to bring this mix of new and legacy technology under control is to abstract this complexity through a management software layer that presents a single interface for all technologies in place. This is where an integrated suite of management tools based on transaction models represents not only a better way to manage infrastructures and applications today, but also a better preparation for managing the ever-growing complex environment of tomorrow. The survey respondents' view of the ideal tool set feature-functions validates the application performance management reference model proposed in this paper (see Figure 17).

Figure 17

Key Features Of An Ideal Monitoring/Management Solution



Base: 159 IT decision-makers at North American enterprises

Source: A commissioned study conducted by Forrester Consulting on behalf of Riverbed, June 2013

KEY RECOMMENDATIONS

This study shows that application and business services performance problems have the greatest impact on an enterprise bottom line, but they are the most difficult issues to resolve. The lack of tools for proactive alerting and root-cause identification is a major obstacle to rapid resolution. This leads not only to escalating business costs, but also to a fragmented and inefficient use of IT resources.

- **IT organizations need the right tools to be efficient.** To serve a dynamic IT organization, the tool set used must have broad domain monitoring capabilities that can be abstracted in a way that focuses on services and therefore be able to model business services' dependencies on the underlying infrastructure that is used to deliver each application. The result promotes cooperation across teams, better resource prioritization, and more streamlined troubleshooting.
- **The tools must provide the right information.** An important part of the tool integration is the ability to understand the dynamic context of each business service and the ability to model which infrastructure components are used in delivering the service to the end user. This is the basis needed for an accurate analysis of issues.
- **The right information must promote team cooperation.** Infrastructure and application management requires teamwork. Multiple constituencies intervene at the different stages of the incident and problem management process. Each of these participants must not only find the right information to perform their tasks, but do so in accordance with the other team members. A common, integrated view of all component data is a key feature of a management solution.

Appendix A: Methodology

In this study, Forrester conducted an online survey of 159 IT organizations with more than 1,000 employees in North America to evaluate the current state of application availability and performance, the consequences of availability and performance issues, and the desires for an ideal service management automation solution. Survey participants included IT decision-makers across all major industries with the responsibility for network systems and/or application delivery. The study began in May 2013 and was completed in June 2013.

Appendix B: Supplemental Material

Related Forrester Research

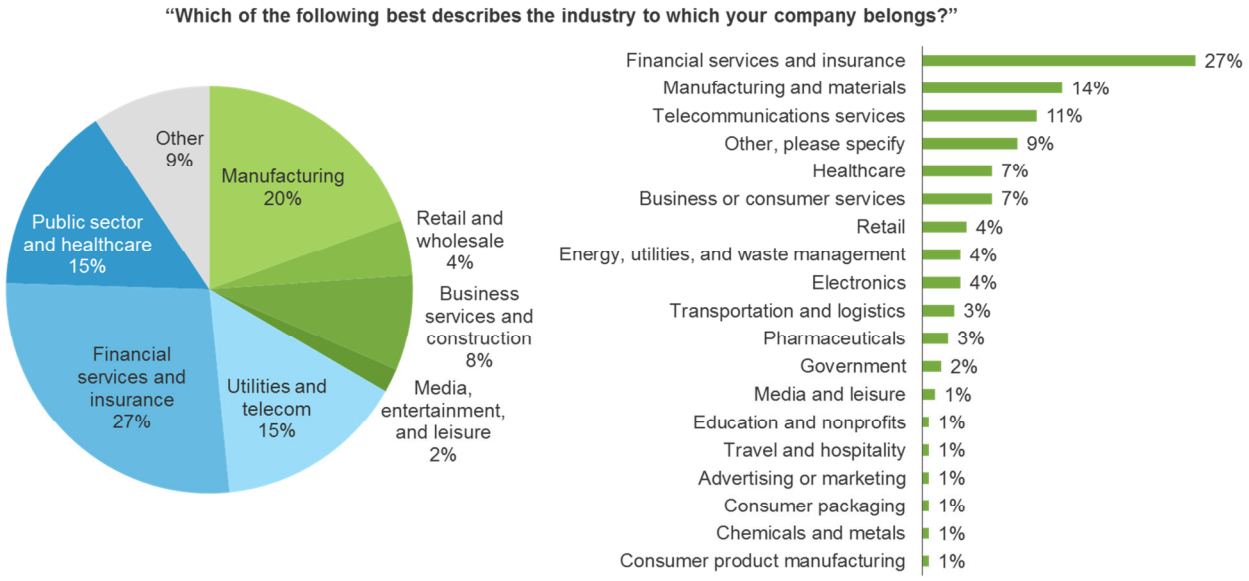
"Realize Practical Application Performance Management," Forrester Research, Inc., February 27, 2013

"Turn Big Data Inward With IT Analytics," Forrester Research, Inc., December 5, 2012

"Market Overview: Application Performance Management, Q4 2011," Forrester Research, Inc., December 7, 2011

Appendix C: Demographics/Data

Figure 18
Respondent Demographics



Base: 159 IT decision-makers at North American enterprises

Source: A commissioned study conducted by Forrester Consulting on behalf of Riverbed, June 2013

Appendix D: Endnotes

[1] From human-computer interaction studies. These studies have been summarized in *Usability Engineering* by Jakob Nielsen (Morgan Kaufmann, San Francisco). They show that a user loses focus after 10 seconds. This should be considered the upper limit in the design of eCommerce transactions. Source: Jakob Nielsen, *Usability Engineering*, Morgan Kaufmann, 1993.

[2] Watts Humphrey (1927-2010) developed the "Software Capability Maturity Model" while working at the Software Engineering Institute at Carnegie Mellon University. He is the author of *Managing the Software Process* and was considered a worldwide authority in software engineering.

See Watts Humphrey's columns. Source: "The Watts New? Collection: Columns by the SEI's Watts Humphrey," Carnegie Mellon University (http://www.sei.cmu.edu/library/abstracts/newsletters/wattsnewcompiled.cfm?DCSext.abstractsource=RelatedLinks).

[3] IT management solutions are successful, but they follow the market appearance, by their nature, of the technology that they are managing.

[4] Zeno's Achilles paradox illustrates the hypothesis that a continuum (the evolution of technology) cannot be represented by a series of discrete events (the installation and use of management software solutions). Regardless of how fast solutions are brought to market, they are always behind the technology that they manage. Source: "Zeno and the Paradox of Motion," MathPages (http://www.mathpages.com/rr/s3-07/3-07.htm).