

Application Performance in Complex and Hybrid Environments

January 2012

Jim Rapoza

Executive Summary

Companies that do not rise to the challenges of ensuring performance over complex networks find it increasingly difficult to compete in a virtualized, cloud-based world. Organizations improve performance using several different technologies, which increases the complexity of performance management initiatives. The emerging nature of application deployment and consumption in today's businesses adds to this complexity. Now it is common for applications to be delivered via cloud based systems, both internal and public, and increasingly these applications are consumed on mobile devices such as smartphones and tablets.

Research Benchmark

Aberdeen's Research Benchmarks provide an in-depth and comprehensive look into process, procedure, methodologies, and technologies with best practice identification and actionable recommendations

Best-in-Class Performance

Aberdeen used the following three key performance criteria to distinguish Best-in-Class companies:

- 27% reduction in time for root-cause identification
- 11% reduction in the number of end user complaints
- 94% transaction completion rate

Competitive Maturity Assessment

Survey results show that the firms enjoying Best-in-Class performance shared several common characteristics, including:

- 24% more likely to have currently implemented technologies to measure application response times
- Have a high level of user satisfaction with application performance
- Twice as much experience at using performance management and monitoring technologies

Required Actions

In addition to the specific recommendations in Chapter Three of this report, to achieve Best-in-Class performance, companies must:

- Centralize management and monitoring of application and network performance
- Define acceptable application performance baselines
- Reduce time needed to identify root causes of performance issues

Table of Contents

Executive Summary.....	2
Best-in-Class Performance.....	2
Competitive Maturity Assessment.....	2
Required Actions.....	2
Chapter One: Benchmarking the Best-in-Class.....	4
Business Context	4
The Maturity Class Framework.....	5
The Best-in-Class PACE Model	6
Best-in-Class Strategies.....	7
Chapter Two: Benchmarking Requirements for Success.....	9
Competitive Assessment.....	10
Capabilities and Enablers.....	11
Chapter Three: Required Actions	15
Laggard Steps to Success.....	15
Industry Average Steps to Success	16
Best-in-Class Steps to Success	16
Appendix A: Research Methodology.....	18
Appendix B: Related Aberdeen Research.....	20

Figures

Figure 1: Top Internal Pressures Driving Companies to Devote Resources to Application Performance Improvement	4
Figure 2: Top External Pressures Driving Companies to Devote Resources to Application Performance Improvement	5
Figure 3: Employee Satisfaction with Application Performance.....	6
Figure 4: Best-in-Class Strategic Approaches to Application Performance....	7
Figure 5: Defined Baselines For Acceptable Performance	8
Figure 6: Centralized management of applications and transactions	12
Figure 7: Technology Roadmaps for Businesses With Complex Application Environments	14

Tables

Table 1: Top Performers Earn Best-in-Class Status.....	6
Table 2: The Best-in-Class PACE Framework	7
Table 3: The Competitive Framework.....	10
Table 4: The PACE Framework Key	19
Table 5: The Competitive Framework Key	19
Table 6: The Relationship Between PACE and the Competitive Framework	19

Chapter One: Benchmarking the Best-in-Class

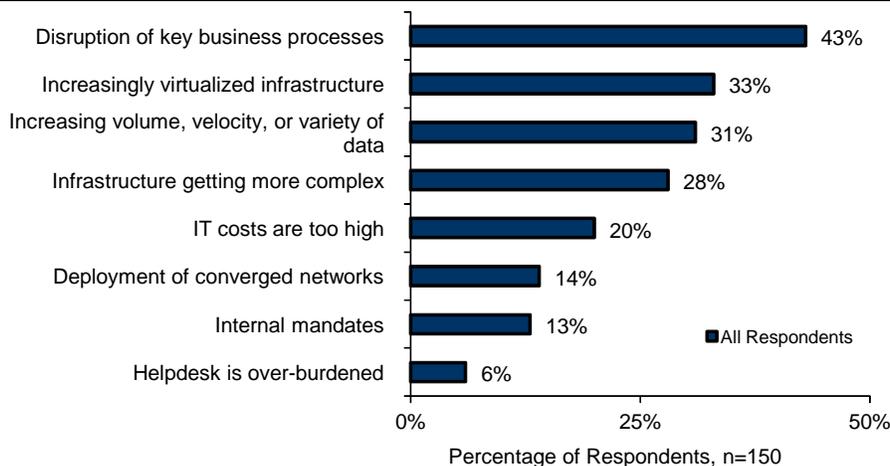
Business Context

Companies that do not rise to the challenges of ensuring performance over complex networks find it increasingly difficult to compete in a virtualized, cloud-based world. While organizations with traditional and simple on-premise application environments may be able to get away with old-school performance solutions such as throwing more hardware into the data center, companies that have complex virtual and cloud-based infrastructures are taking actions to increase their ability to monitor and manage application performance. For example, 40% of organizations with complex environments have deployed application performance management systems versus only 23% of those with simple on-premise infrastructures. And 44% of organizations dealing with complex application environments have deployed network infrastructure or performance improvement resources, while only 35% of those with simple environments have done the same.

Fast Facts

- ✓ 74% of knowledge workers complain about application response time
- ✓ 43% of organizations say that applications are too complex

Figure 1: Top Internal Pressures Driving Companies to Devote Resources to Application Performance Improvement

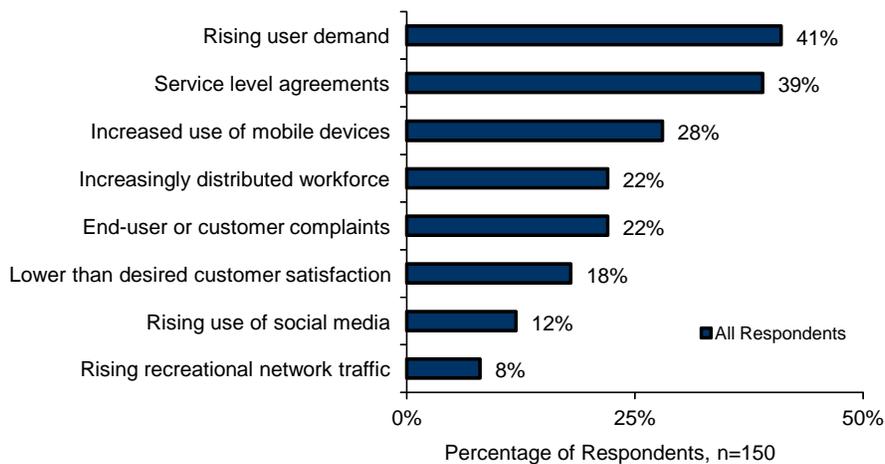


Source: Aberdeen Group, December 2011

Tracking down the cause of an application performance problem is an involved and many-layered task. Businesses that understand their overall performance baselines are the first to identify unusual application behavior. Top performing companies also have detailed analytics that provide a unified view into overall application and network performance. Real-time monitoring and alerting capabilities allow organizations to know when a performance issue occurs. And businesses that are leaders in application performance have the proper tools in place to control how applications consume WAN and network resources and optimize performance.

The Best-in-Class have not only taken advantage of technologies that provide full visibility into and monitoring of their application and network performance, they are also much more likely to have been using performance management solutions for a longer time. They have used this edge in experience and knowledge to build an effective infrastructure for detecting and remedying performance issues before they cause serious problems.

Figure 2: Top External Pressures Driving Companies to Devote Resources to Application Performance Improvement



Source: Aberdeen Group, December 2011

This unified approach to application performance makes it possible for the Best-in-Class to reduce application downtime, boost overall performance and increase user satisfaction with application performance and usability.

The Maturity Class Framework

Poorly performing applications harm a business in many ways. Application downtime can incur serious costs in terms of both in IT staff resources and user productivity. Poor performance leads to applications that employees or customers don't want to use. Best-in-Class organizations take advantage of application performance technologies to reduce (or eliminate) downtime, boost overall performance and increase user satisfaction.

Aberdeen used three key performance criteria to distinguish the Best-in-Class from Industry Average and Laggard organizations:

- Faster response times to identify and solve the causes of performance issues:
- Higher levels of success at cutting down on the number of user complaints relating to application performance and usability
- Stronger application performance as measured by transaction completion rates

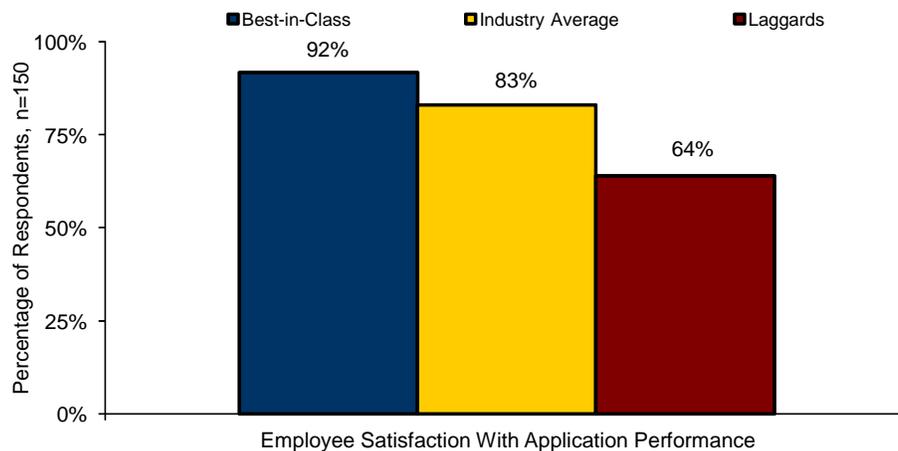
Table 1: Top Performers Earn Best-in-Class Status

Definition of Maturity Class	Mean Class Performance
Best-in-Class: Top 20% of aggregate performance scorers	<ul style="list-style-type: none"> ▪ 27% reduction in time for root-cause identification ▪ 11% reduction in the number of end user complaints ▪ 94% transaction completion rate
Industry Average: Middle 50% of aggregate performance scorers	<ul style="list-style-type: none"> ▪ 10% reduction in time for root-cause identification ▪ 14% increase in the number of end user complaints ▪ 90% transaction completion rate
Laggard: Bottom 30% of aggregate performance scorers	<ul style="list-style-type: none"> ▪ 34% increase in time for root-cause identification ▪ 19% increase in the number of end user complaints ▪ 71% transaction completion rate

Source: Aberdeen Group, December 2011

Employees at Best-in-Class organizations are more satisfied with application performance. This shows a strong correlation between good application performance management and having users that are happy with using applications.

Figure 3: Employee Satisfaction with Application Performance



Source: Aberdeen Group, December 2011

The Best-in-Class PACE Model

Using application performance and WAN optimization technologies to achieve corporate goals requires a combination of strategic actions,

organizational capabilities, and enabling technologies that can be summarized as follows:

Table 2: The Best-in-Class PACE Framework

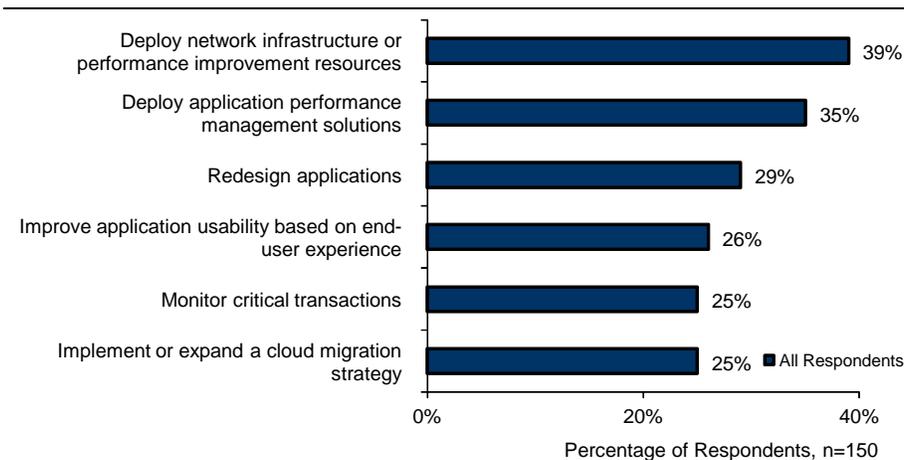
Pressures	Actions	Capabilities	Enablers
<ul style="list-style-type: none"> Disruption of key business processes 	<ul style="list-style-type: none"> Deploy application performance management solutions Deploy network infrastructure or performance improvement resources 	<ul style="list-style-type: none"> Ability to identify sources of delay in application response time Centralized management of applications and transactions Defined baselines for acceptable performance Network and application performance includes multiple physical locations 	<ul style="list-style-type: none"> Real-time alerts for applications and business processes Tools for deep-packet inspection Access to production (live) data for system deployment testing SPAN / Mirror ports

Source: Aberdeen Group, December 2011

Best-in-Class Strategies

Based on the data from this survey, Best-in-Class organizations were clearly driven by the need to maximize efficiency of network resources. Through the use of unified and in-depth analytics and monitoring, they also gained a deep understanding of how the WAN and network are being used and what types of resources are required by applications in order to properly utilize their WAN acceleration solutions. With these twin goals of visibility into network resource usage and full utilization of network resources, these organizations were also able to increasingly centralize applications and services, which in turn increased their ability to boost network capacity.

Figure 4: Best-in-Class Strategic Approaches to Application Performance

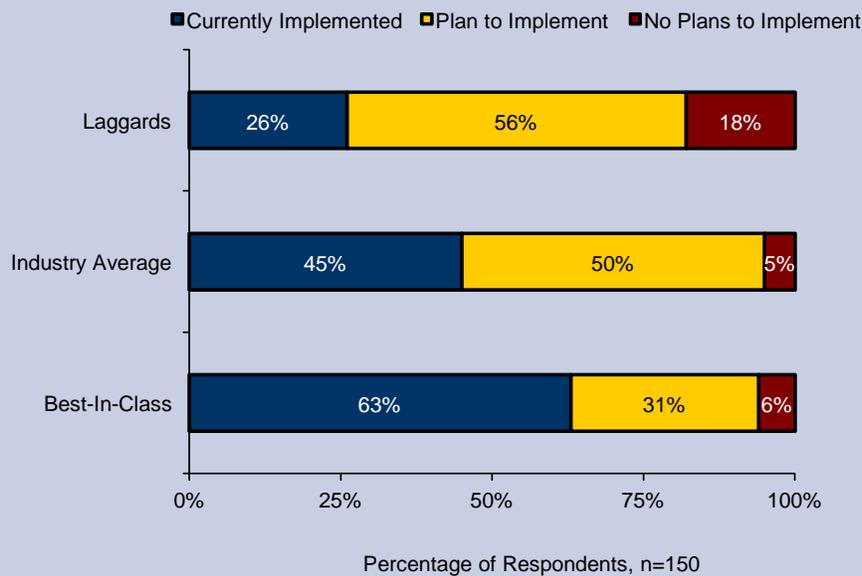


Source: Aberdeen Group, December 2011

Aberdeen Insights — Strategy

To truly understand how applications are performing, businesses need to establish baselines for performance. This is certainly true of Best-in-Class organizations. Industry Average and Laggard companies are just guessing whether their applications are performing well. Or, more likely, they only know about application problems that become serious.

Figure 5: Defined Baselines For Acceptable Performance



Source: Aberdeen Group, December 2011

Organizations which want to have a top performing application performance management solution must understand performance baselines. Businesses that know their typical and ideal performance levels are well positioned to handle performance issues before they create serious business problems and costs.

In the next chapter, we will see what the top performers are doing to achieve these gains.

Chapter Two: Benchmarking Requirements for Success

The selection of an application performance management solution, and its integration with cloud and virtual environments, plays a crucial role in turning the strategies described in Chapter 1 into profit.

Case Study — Call Center, Latin America

A call center firm based in Latin America was faced with several of the top pressures that businesses today must overcome in order to improve application performance. The company had a complex and distributed network infrastructure, with bandwidth intensive and real-time applications deployed to over twenty physical locations. They had implemented a converged network environment, and needed high-level performance for these business-critical VOIP and collaboration applications. This converged infrastructure also led to greatly increased data volumes, and the strain on the network and application performance gave rise to end-user complaints about application response time and usability.

The firm decided that they lacked the right tools to handle performance problems, and also lacked visibility into how end-users perceived application performance. They invested in tools to monitor critical applications, automated performance monitoring and root cause analysis of performance issues, and studied how application performance impacted user productivity.

The firm has made many of the moves that categorize a Best-in-class organization when it comes to application performance. They centralized application performance management and monitoring, implemented tools for real-time optimization and prioritization of application performance, and dedicated increased IT resources to monitoring and managing application performance and resolving performance issues. The firm also deployed technologies to monitor end-user experience and control the bandwidth use of applications (giving critical applications priority over non-essential applications).

These actions led to many improvements in the company's overall application performance quality, and increased user satisfaction. Overall, 90 to 99% of application transactions meet the firm's response time expectations. From an employee standpoint, there has satisfaction with application performance and usability has been high.

Going forward, the call center firm is planning to add more features for handling root cause analysis, increasing their ability to identify and fix performance problems quickly. They are also planning to implement tools to help them identify and define performance thresholds.

Fast Facts

- √ 19% of all businesses said they are monitoring performance of mobile applications
- √ 47% of organizations have no plan to monitor application performance in the cloud

Competitive Assessment

Aberdeen Group analyzed the aggregated metrics of surveyed companies to determine whether their performance ranked as Best-in-Class, Industry Average, or Laggard. In addition to having common performance levels, each class also shared characteristics in five key categories: (1) **process** (the approaches they take to execute daily operations); (2) **organization** (corporate focus and collaboration among stakeholders); (3) **knowledge management** (contextualizing data and exposing it to key stakeholders); (4) **technology** (the selection of the appropriate tools and the effective deployment of those tools); and (5) **performance management** (the ability of the organization to measure its results to improve its business). These characteristics (identified in Table 3) serve as a guideline for best practices, and correlate directly with Best-in-Class performance across the key metrics.

Table 3: The Competitive Framework

	Best-in-Class	Average	Laggards
Process	Provide performance intelligence to key stakeholders		
	33%	22%	17%
Process	Defined baselines for acceptable performance		
	58%	45%	28%
Organization	Centralized management of applications and transactions		
	52%	41%	22%
Knowledge	Ability to identify sources of delay in application response time		
	53%	38%	33%
	Measure Web session abandonment rate		
Performance	34%	25%	17%
	Measure application response times		
	66%	55%	43%
Technology	Measure application performance across geographies		
	35%	28%	22%
	IT resources dedicated to monitoring and managing application performance and resolving issues		
	45%	41%	36%
Technology	Ability to perform root-cause analysis on application issues		
	43%	38%	24%
	Network and application performance includes multiple physical locations		
Technology	55%	41%	39%

Source: Aberdeen Group, December 2011

Capabilities and Enablers

Based on the findings of the Competitive Framework and interviews with end users, Aberdeen's analysis of the Best-in-Class demonstrates that taking a unified approach to APM and giving performance information to key stakeholders will lead to success with application and network performance management technology. The right application performance information must be put in the right hands at the right time.

Process

The personnel most likely to understand an application's performance and usability are those who use and rely on the application. Top performing organizations provide performance information to key stakeholders. Laggards provided this information to key stakeholders less than half as often as the Best-in-Class; at Laggard companies, performance metrics likely stayed in the hands of technical staff, who may not understand the users' experience of the application. When they understand users' application experiences, Best-in-Class companies can manage issues that may not show up in pure numbers.

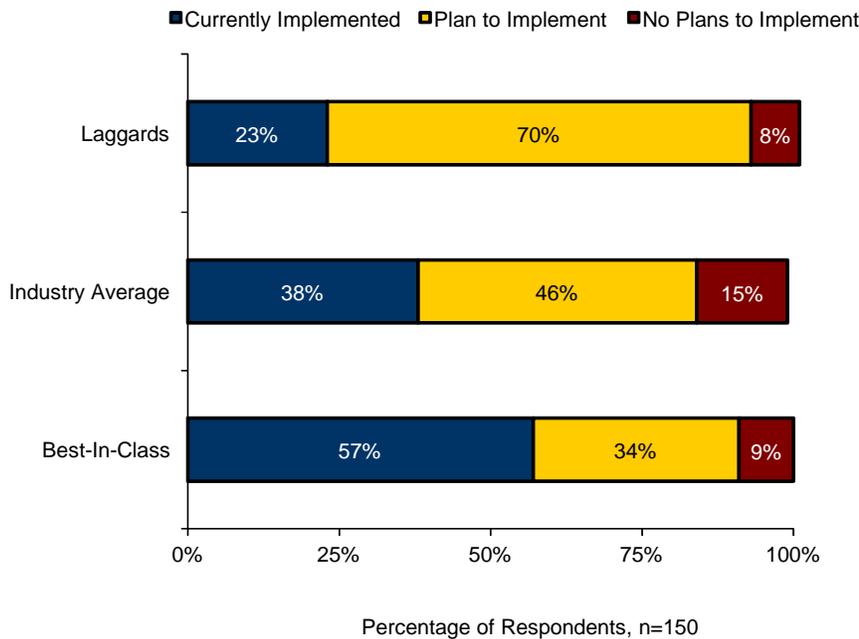
Organization

Given the disparate technologies used to analyze, monitor, and manage application and network performance, many businesses have to work with a number of data sources and management consoles, adding to the complexity of performance management. Leading organizations overcome these problems by using centralized management interfaces, which provide a complete view of all the factors affecting application performance and end-user satisfaction. Only 23% of Laggard companies used centralized management tools, versus 57% of Best-in-Class.

"I was really looking for somebody who had a performance management solution that had different components that could help me up and down the stack. If I could get it all from one place, I would prefer that."

~ Senior IT Manager, green technology manufacturer.
North America

Figure 6: Centralized management of applications and transactions



Source: Aberdeen Group, December 2011

Knowledge Management

As mentioned earlier, visibility is a key factor for successfully identifying and managing performance problems. To manage performance, companies must know when a problem occurs, what caused the problem and what needs to be done to fix it. This is an area where the Best-in-Class organizations outpace their Industry Average and Laggard companies. The ability to tell when applications aren't working properly and identify the source of performance delays, gives these organizations a significant edge when it comes to combating and preventing performance problems.

Performance Management

To qualify as having performance management, an organization must at the very least measure basic performance metrics such as application response time. Fewer than 50% of Laggard businesses met this very low bar, and only 22% measured how applications performed across different geographic regions. To manage application performance, businesses need more than a gut instinct that an application is performing badly, they must regularly monitor performance and manage based on that data.

Technology

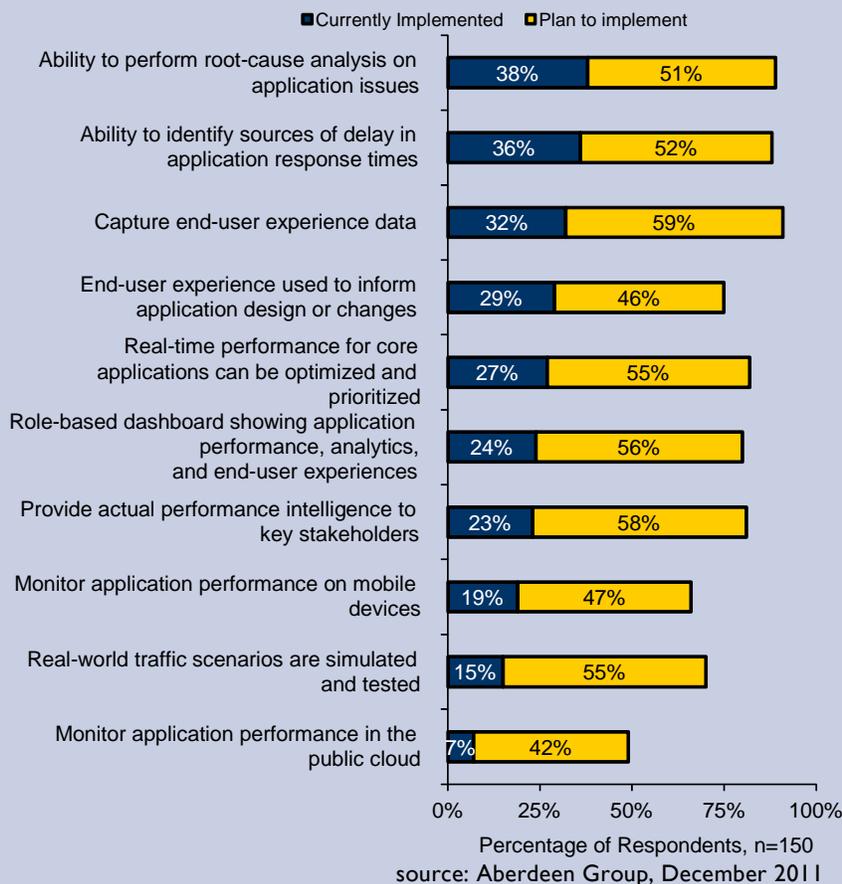
From analytics to monitoring to testing to optimization solutions, the Best-in-Class organizations exceeded Industry Average and Laggard companies in the adoption and effective deployment of these performance technologies.

The effective use of these technologies certainly paid off for these top organizations. Best-in-Class organizations were able to identify the root cause of application problems nearly 60% faster than Laggard businesses. This means they experienced far less downtime and much higher application productivity.

Aberdeen Insights — Technology

The Aberdeen Group identified organizations with application deployments that involved virtual and cloud-based systems as having complex application infrastructures. Not surprisingly, these organizations are implementing and planning to implement application technologies that will increase their ability to monitor and manage application performance in these increasingly complex environments. Core technologies that businesses with complex environments are planning to implement include the ability to monitor public cloud and mobile applications, increased capabilities for real-world and real-time testing, and improved end-user data and information. As modern technology trends move toward mobile and cloud-based application systems, organizations already dealing with complex environments understand the need for improved information about application performance.

Figure 7: Technology Roadmaps for Businesses With Complex Application Environments



Chapter Three: Required Actions

Best-in-Class organizations understand the importance of an end-to-end approach to application performance management, especially in complex environments with virtual and cloud-based infrastructures. These businesses:

- Know that they need to understand what constitutes a performance issue
- Have the ability to detect problems when they occur
- Can take action to address performance issues before they impact the bottom line.

Whether a company is trying to improve its application and network performance management initiatives from Laggard to Industry Average, or Industry Average to Best-in-Class, the following actions will help spur the necessary transformation:

Laggard Steps to Success

- **Start measuring performance.** A business that doesn't measure the most basic performance metrics isn't really managing application performance. Only 43% of Laggards measure such basic metrics application response time, indicating that many Laggards don't even have a performance management initiative. Knowing how your applications are performing is key to improving user experience. Laggard organizations need to measure and monitor application performance to detect application problems before they become business problems.
- **Define performance baselines.** What is the difference between good application performance, average performance and poor application performance? Many laggard organizations can't answer these simple questions. Only 26% have analyzed their applications to define a baseline for acceptable application performance. Once they determine how applications should perform, laggards can start building the core needed to manage application performance effectively. A good baseline makes it possible to know when applications are performing to expectations.
- **Dedicate resources to performance management.** Application performance can't be managed by buying a black box and throwing a switch. IT resources in time, staff, and equipment must be dedicated to manage and improve application performance. With only 36% dedicating resources to monitoring and managing application performance, Laggards come up short compared to other respondents. By gaining visibility into application performance, and the expertise needed to manage and optimize applications and

Fast Facts

- √ 75% of organizations monitor performance of VOIP traffic
- √ 48% of organizations monitor performance of social networking applications

How Does Your Performance Compare to the Best-in-Class?



- Compare your processes
- Receive a free, personal PDF scorecard
- Benefit from custom recommendations to improve your performance, based on the research

Take the Assessment

Receive Your Free Scorecard

networks, Laggards can begin to achieve some of the performance and user satisfaction gains Best-in-Class businesses have earned.

Industry Average Steps to Success

- **Identify the problems.** Knowing you have an application problem is an important step in performance management. But knowing the cause of the problem is essential to having any chance at fixing it. Average organizations need to invest in analytical and monitoring tools that give them the ability to detect the source of application performance problems. By identifying the source of problems, these businesses will be able to remedy performance issues more quickly, increasing application uptime and user satisfaction.
- **Centralize management.** Industry Average businesses are only 23% likely to centralize the management and monitoring of application performance. Multiple administration interfaces and data sources confront Average firms with unnecessary work and complexity. By centralizing application performance analytics, monitoring and control systems, Industry Average organizations can make administration easier, and gain a unified view of their overall application performance infrastructure.
- **Distribute Application performance monitoring.** With more and more application traffic coming from satellite offices, mobile workers, and global customers and partners, companies must have the ability to measure performance from multiple locations and across geographies. Not all application performance issues are local. A user in California may be having issues with an application which performs perfectly for a user in Texas. Since only 28% of Industry Average organizations measuring performance across geographies, many of these businesses are missing the big picture of application performance. With more and more traffic becoming mobile and distributed, these companies will need to take advantage of distributed performance management solutions to see all sides of application and network performance.

Best-in-Class Steps to Success

- **Democratize performance data.** While the Best-in-Class have outpaced the Industry Average and Laggards when it comes to providing performance intelligence to key stakeholders, they should to push this trend further. When performance data stays behind organizational walls, it is harder for the right information to find itself in the right hands. Just as web traffic data has been widely distributed throughout companies using easy-to-understand dashboards and portals, performance data also must be ubiquitous. Those who use the applications understand them best, and are in the ideal position to identify both performance and usability issues.

- **Look for application performance patterns.** The world is a chaotic place—but application performance problems can often be predicted. By tracking the usage patterns of their applications, Best-in-Class businesses will be able to identify problems before they occur, from peak usage occurrences to application performance anomalies to non-critical applications impacting the performance of business critical applications. With this tracking, Best-in-Class organizations can keep their lead in performance management, and push their application uptime and user satisfaction numbers even higher.

Aberdeen Insights — Summary

Applications are the lifeblood of most organizations. They connect employees, customers and business partners. They provide valuable insight and direction. They boost productivity and revenue. But just as heart problems make a person sick, a poorly performing application reduces productivity, increases support costs, and can even lead to lost sales and revenue.

An investment in application and network performance management technologies is, in many ways, an investment in the health of your business. Best-in-Class organizations have leveraged their high visibility into application and network performance, along with their ability to identify and respond to problems, to increase application uptime, decrease support costs, and boost user satisfaction with business-critical applications.

Right now we are seeing a lot of changes in application and network performance solutions. Many vendors realize that companies are looking for solutions that address all aspects of their application performance issues and that they want these technologies to work well together to ease the complexity of dealing with application performance.

With more applications moving to the cloud and being delivered to mobile and roaming workers, performance management will stay complex. Businesses that understand the need for high visibility into performance issues and the need to respond to problems quickly will stay ahead of the curve.

Appendix A: Research Methodology

From January 2011 through December 2011, Aberdeen examined the use, the experiences, and the intentions of more than 200 enterprises using application and network performance technologies in a diverse set of enterprises.

Aberdeen supplemented this online survey effort with telephone interviews with select survey respondents, gathering additional information on application and network performance strategies, experiences, and results.

Responding enterprises included the following:

- *Job title:* The research sample included respondents with the following job titles: CEO / President, EVP / SVP / VP (24%); Director (19%); Manager (28%); Staff (11%).
- *Department / function:* The research sample included respondents from the following departments or functions: IT manager or staff (35%); business development (16%); and corporate management (7%).
- *Industry:* The research sample included respondents from telecom industries (17%), IT Services (34%), software and hardware companies (20%), financial services (9%) and less than 5% from each of more than 15 other industries.
- *Geography:* The majority of respondents (51%) were from North America. Remaining respondents were from Europe (23%), the Asia-Pacific region (18%) and elsewhere (6%).
- *Company size:* Twenty-eight percent (28%) of respondents were from large enterprises (annual revenues above US \$1 billion); 26% were from midsize enterprises (annual revenues between \$50 million and \$1 billion); and 47% of respondents were from small businesses (annual revenues of \$50 million or less).
- *Headcount:* Forty-five percent (45%) of respondents were from large enterprises (headcount greater than 1,000 employees); 21% were from midsize enterprises (headcount between 100 and 999 employees); and 34% of respondents were from small businesses (headcount between 1 and 99 employees).

Study Focus

Responding executives completed an online survey that included questions designed to determine the following:

- √ The degree to which performance management solutions are deployed in their operations and the financial implications of the technology
- √ The structure and effectiveness of existing application and network performance implementations
- √ Current and planned use of application and network performance Solutions to aid operational activities
- √ The benefits, if any, that have been derived from application and network performance initiatives

The study aimed to identify emerging best practices for application and network performance monitoring, visibility, and acceleration and to provide a framework by which readers could assess their own management

Table 4: The PACE Framework Key

Overview
<p>Aberdeen applies a methodology to benchmark research that evaluates the business pressures, actions, capabilities, and enablers (PACE) that indicate corporate behavior in specific business processes. These terms are defined as follows:</p> <p>Pressures — external forces that impact an organization’s market position, competitiveness, or business operations (e.g., economic, political and regulatory, technology, changing customer preferences, competitive)</p> <p>Actions — the strategic approaches that an organization takes in response to industry pressures (e.g., align the corporate business model to leverage industry opportunities, such as product / service strategy, target markets, financial strategy, go-to-market, and sales strategy)</p> <p>Capabilities — the business process competencies required to execute corporate strategy (e.g., skilled people, brand, market positioning, viable products / services, ecosystem partners, financing)</p> <p>Enablers — the key functionality of technology solutions required to support the organization’s enabling business practices (e.g., development platform, applications, network connectivity, user interface, training and support, partner interfaces, data cleansing, and management)</p>

Source: Aberdeen Group, December 2011

Table 5: The Competitive Framework Key

Overview	
<p>The Aberdeen Competitive Framework defines enterprises as falling into one of the following three levels of practices and performance:</p> <p>Best-in-Class (20%) — Practices that are the best currently being employed and are significantly superior to the Industry Average, and result in the top industry performance.</p> <p>Industry Average (50%) — Practices that represent the average or norm, and result in average industry performance.</p> <p>Laggards (30%) — Practices that are significantly behind the average of the industry, and result in below average performance.</p>	<p>In the following categories:</p> <p>Process — What is the scope of process standardization? What is the efficiency and effectiveness of this process?</p> <p>Organization — How is your company currently organized to manage and optimize this particular process?</p> <p>Knowledge — What visibility do you have into key data and intelligence required to manage this process?</p> <p>Technology — What level of automation have you used to support this process? How is this automation integrated and aligned?</p> <p>Performance — What do you measure? How frequently? What’s your actual performance?</p>

Source: Aberdeen Group, December 2011

Table 6: The Relationship Between PACE and the Competitive Framework

PACE and the Competitive Framework – How They Interact
<p>Aberdeen research indicates that companies that identify the most influential pressures and take the most transformational and effective actions are most likely to achieve superior performance. The level of competitive performance that a company achieves is strongly determined by the PACE choices that they make and how well they execute those decisions.</p>

Source: Aberdeen Group, December 2011

Appendix B: Related Aberdeen Research

Related Aberdeen research that forms a companion or reference to this report includes:

Benchmarking Converged Network Performance; March 2011

Managing Virtualized Applications: Optimizing Dynamic Infrastructures; April 2011

2011 WAN Acceleration: State of the Market; January 2011

Information on these and any other Aberdeen publications can be found at www.aberdeen.com.

Author(s): Jim Rapoza, Research Consultant, Network & Application Performance (jim.rapoza@aberdeen.com)

For more than two decades, Aberdeen's research has been helping corporations worldwide become Best-in-Class. Having benchmarked the performance of more than 644,000 companies, Aberdeen is uniquely positioned to provide organizations with the facts that matter — the facts that enable companies to get ahead and drive results. That's why our research is relied on by more than 2.5 million readers in over 40 countries, 90% of the Fortune 1,000, and 93% of the Technology 500.

As a Harte-Hanks Company, Aberdeen's research provides insight and analysis to the Harte-Hanks community of local, regional, national and international marketing executives. Combined, we help our customers leverage the power of insight to deliver innovative multichannel marketing programs that drive business-changing results. For additional information, visit Aberdeen <http://www.aberdeen.com> or call (617) 854-5200, or to learn more about Harte-Hanks, call (800) 456-9748 or go to <http://www.harte-hanks.com>.

This document is the result of primary research performed by Aberdeen Group. Aberdeen Group's methodologies provide for objective fact-based research and represent the best analysis available at the time of publication. Unless otherwise noted, the entire contents of this publication are copyrighted by Aberdeen Group, Inc. and may not be reproduced, distributed, archived, or transmitted in any form or by any means without prior written consent by Aberdeen Group, Inc. (2011a)