Becoming Proactive In Application Performance Management

The Business Impact Of Application Reliability Requires A Holistic Approach

A commissioned study conducted by Forrester Consulting on behalf of Compuware Corporation
July 2008
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Executive Summary

Many IT organizations have now established effective monitoring systems for the various infrastructure domains in an enterprise-wide IT landscape: servers, storage, network, peripherals and desktops. The management of application performance, however, is more complicated and does not yet reflect this maturity. There is no holistic view of application performance management and most IT Operations groups are not equipped to be proactive enough to anticipate issues before end users call the help desk.

Compuware Corporation commissioned Forrester Consulting to survey 389 global technology decision-makers actively involved in application performance management (APM) to assess the effectiveness of their processes and the technologies they employ. These decision-makers were asked about their application performance management processes, which technologies they used and the challenges they faced.

A major paradox emerging from the survey is that 87% of the respondents replied that they are using end user experience monitoring tools for at least some business critical applications but, in a later question, 64% of them admit that they only know that end users are experiencing performance or availability problems when the end users register a complaint with the help desk. Forrester believes that most of the enterprises consider application management tools to be their end user experience monitors and have not yet taken advantage of new technologies which really do monitor the true end user experience including the effect of network, servers, databases and applications.

In summary, the key findings from the survey are:

- IT is still taking a reactive, firefighting approach in its APM processes.
- IT lacks an understanding of the business impact of the issues, preventing them from assigning realistic priorities.
- Even if the fault domain of issues can be identified, itself a challenge for most IT organizations, there is a lack of diagnostic tools and processes to drill-down and analyze application performance effectively.

IT organizations that do not invest in application performance management tools that consolidate data across technology silos, including the multitude of applications that run in parallel, will not be able to deliver a proactive, holistic, business-oriented service to their customers. IT organizations must employ technologies like end user experience monitoring as well as re-organize to better reflect business priorities and interests.
Perspectives Of Application Performance Management

Most IT organizations have now established effective monitoring systems for the various infrastructure domains in an enterprise-wide IT landscape: servers, storage, network, peripherals and desktops. Many of these monitoring tools even enable IT Operations professionals to be more proactive by anticipating breaches or incidents through trending analysis and forecasting. The management of application performance, however, is more complicated and does not yet reflect this maturity.

This is partly a result of organization: application development teams are separated from IT Operations and they work under different success parameters. Also, understanding application performance requires a cross-domain perspective, but IT Operations is often still organized by domain, so there is nobody really responsible for this cross-domain perspective. Forrester observes that one of the main challenges in analyzing application performance is that IT Operations staff do not know enough about the application itself, and including application development colleagues (or a software vendor) in an application problem solving exercise is time-consuming and often unrealistic. So the most common approach is to try and isolate the fault domain of an application issue by only investigating which element of the infrastructure is at fault, instead of considering the code or data design of the application itself. Best practice methodologies and tools enable the analysis of application performance issues at the level of the full application environment within the context of the infrastructure – a holistic approach to application performance management.

Often, when an application problem is reported, it is frequently not even possible to replicate the user's complaint by finding the associated fault in an infrastructure component. This is because there isn't one. The classic scenario still prevails: a group of server-, network-, database- and application-managers all claiming that their component is not at fault while the end user is adamant that something is wrong. In fact, the only true perspective of application performance, expressed in terms of responsiveness and availability, is the behavior of individual application transactions (not business transactions but any interactions with the application) viewed completely end-to-end and reflecting the experience from the end user side of the system.

So, while the rest of IT is well equipped to progress successfully to providing a more proactive management of IT, application performance management is often still an excessively manual process as well as being a highly-reactive one, dependent upon input from end users who report incidents to the help desk. However, this is a highly critical status because the perceived quality of service from IT, as far as the business users is concerned, is based solely on the performance of their business applications.

In a study commissioned by Compuware, Forrester Consulting surveyed 389 global technology decision-makers actively involved in application performance management to assess the effectiveness of their processes and the technologies they employ. The majority of these respondents have service level agreements (SLAs) established with their users but admit that they meet these expectations less than 75% of the time. Further, the top two reasons for not meeting the SLA metrics were “Business had higher expectations” and failure to manage “Application performance issues that were already present at launch”, which confirms the fact that users and the business consider the performance of their application to be more paramount than any detailed SLA metrics documented by the IT Operations department.
Complexity Gets In The Way

Managing the application portfolio is also becoming increasingly difficult. There is an increasing complexity of end users, inside and outside the enterprise, running their applications from different devices, over different networks which monitoring systems cannot capture in a consolidated manner. This complexity challenge is likely to accelerate in the future with the introduction of applications based on services oriented architectures and virtualization technologies.

When asked about the challenges they face, 58% of the respondents cited application complexity and 53% also named managing service levels from the end user perspective as their main challenges. Most IT operations groups are not even well organized to handle many application performance issues and do not have access to application development staff when necessary. So, for 53% of the survey respondents, the problem of having the relevant resources on the operations team to deal with the wide range of complex applications is an acknowledged challenge (see Figure 1).

Nor does the application development group seem to take much notice of IT operations’ needs. Nearly half of the enterprises face difficulty in securing even temporary help from the application development teams. Consequently they are wary of designing and issuing work-arounds to users because they know they may even make the application problem worse. Also, they are nervous about prioritizing which application problems should be dealt with first. Finally, 44% of the respondents realize that their lack of visibility into the application design means that they cannot effectively determine the root cause of application performance issues.
Figure 1: Having the relevant resources on our operations team is the top application performance challenge

“For each of the following statements, please rate how challenging it is for your organization.”

<table>
<thead>
<tr>
<th>Statement</th>
<th>Challenging</th>
<th>Neutral</th>
<th>Not challenging</th>
</tr>
</thead>
<tbody>
<tr>
<td>Having the relevant resources on our operations team to deal with the wide range of complex applications</td>
<td>53%</td>
<td>37%</td>
<td>11%</td>
</tr>
<tr>
<td>Determining whether a work-around actually improved a performance issue without making something worse</td>
<td>46%</td>
<td>38%</td>
<td>15%</td>
</tr>
<tr>
<td>Securing help from the application development teams when we need to solve a difficult performance problem</td>
<td>46%</td>
<td>40%</td>
<td>14%</td>
</tr>
<tr>
<td>Determining the root cause of an application performance issue</td>
<td>45%</td>
<td>42%</td>
<td>13%</td>
</tr>
<tr>
<td>Having visibility into application design and the operation of individual application components</td>
<td>44%</td>
<td>43%</td>
<td>13%</td>
</tr>
<tr>
<td>Prioritizing which application problems we should address</td>
<td>39%</td>
<td>41%</td>
<td>20%</td>
</tr>
</tbody>
</table>

Base: 386

Percentages may not total 100 due to rounding.


So, when faced with application performance issues, IT operations tend to adopt an emergency room or “war room” approach, involving multiple teams to attempt to solve the problems. Other indications of how nervous IT operations is in dealing with application performance issues is that 41% report that they often go through fire drills to address problems that don’t significantly affect the business and 40% acknowledge that they often misdiagnose a performance problem (see Figure 2).
Figure 2: Enterprises often take a “war room” approach to solving application performance issues

“For each of the following statements, please indicate how strongly you agree or disagree.”

<table>
<thead>
<tr>
<th>Statement</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Base</th>
</tr>
</thead>
<tbody>
<tr>
<td>We often take a “war room” approach to solving application performance issues – involving multiple teams.</td>
<td>51%</td>
<td>37%</td>
<td>13%</td>
<td>386</td>
</tr>
<tr>
<td>We often go through fire drills to fix problems that ultimately didn’t significantly affect the business.</td>
<td>41%</td>
<td>41%</td>
<td>18%</td>
<td>383</td>
</tr>
<tr>
<td>We often assign a performance problem and then discover that it should be addressed by a different group.</td>
<td>40%</td>
<td>40%</td>
<td>20%</td>
<td>382</td>
</tr>
</tbody>
</table>


The element of complexity is compounded when the business applications are packaged applications from independent software vendors (ISVs). When asked, 49% of the respondents reported that packaged applications added another layer of complexity to the IT environment and significantly impacted their ability to quickly find and resolve performance problems. In these cases, IT operations staff has even less visibility into the software application design and are usually not trained to troubleshoot. And the environment (platform, other applications) where the packaged application is running may be unique to that enterprise, so the software vendor may also be unsure of the root cause at first. So it is no surprise that enterprises report that they need to involve an expert from the ISV in 40% of the cases where they were dealing with application problems.

Clearly, analyzing and identifying the cause of application problems or performance issues is a complex undertaking. Twenty-one percent of the respondents report that they need a group of more than 10 people for the troubleshooting, diagnosis, and resolution process and only 2% of the companies claim to accomplish this with just one person (see Figure 3).
Becoming Proactive In Application Performance Management

Figure 3: The number of people involved in application problem solving

“On average, how many people are involved in the troubleshooting, diagnosis, and resolution process when a performance problem occurs?”

<table>
<thead>
<tr>
<th>Number of People</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>One person</td>
<td>2%</td>
</tr>
<tr>
<td>Two to five people</td>
<td>42%</td>
</tr>
<tr>
<td>Six to nine people</td>
<td>34%</td>
</tr>
<tr>
<td>Ten to fourteen people</td>
<td>11%</td>
</tr>
<tr>
<td>Fifteen or more people</td>
<td>10%</td>
</tr>
<tr>
<td>Don’t know</td>
<td>1%</td>
</tr>
</tbody>
</table>

Base: 389 global IT decision-makers


The number of people involved seems to be growing over time, reflecting the increase in applications complexity mentioned above. In a similar survey commissioned by Compuware in 2005, Forrester Consulting discovered that 37% of the respondents needed teams of six or more. Now it is 55% needing these larger teams. The formation of these teams is not necessarily systematic or replicable. Often, IT Operations becomes dependent on experts with “tribal knowledge” who may not always be available: 59% of the respondents stated that “they have a couple of people who they always turn to in order to fix most problems.”

The team formed typically to investigate the application issues is expansive and meetings probably take days, at least, to organize. Experts from all infrastructure domains are almost always involved though the attendance of application development or business stakeholders is less common. Note that 16% of the respondents reported that they never included business stakeholders in the application problem solving, which is an indicator of poor business/IT alignment (see figure 4).
Understanding The Business Impact

The complexity of the application landscape within an enterprise, combined with the challenge of coordinating the efforts of a disparate and large team of experts has effectively prevented any improvements in the important service level metric: mean time to resolution (MTTR), regardless of the increased adoption of management tools (see Figure 5).

Figure 5: Nearly two thirds of respondents say that MTTR has increased or stayed the same over the last two years

“How has the mean time to problem resolution (MTTR) changed over the last two years?”

- Increased significantly: 9%
- Decreased significantly: 10%
- Decreased: 23%
- Stayed the same: 31%
- Increased: 26%
- Don’t know: 2%

Base: 389 global IT decision-makers


On average, the enterprises reported that only 66% of application performance issues are resolved within an acceptable time period. The issues with application performance and the time taken to resolve these do have significant impact on the business results of the enterprises. Most respondents are aware of these effects. In response to various questions:

- 64% agreed that poor application performance results in significant financial losses or other serious business problems.

- When asked what financial impact results from poor application performance 40% cited “severe financial impact” while only 12% considered that there was “no financial impact” at all.

- 43% reported that one hour of application downtime costs at least $10,000 including 10% who cited more than $1 million as the cost of downtime.

The respondents also selected other, softer, forms of business impact due to poor application performance (see Figure 6).
Figure 6: The biggest cost of poor applications performance is financial

“What is the cost of poor application performance for your company?”

<table>
<thead>
<tr>
<th>Cost Description</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increases costs to the business</td>
<td>57%</td>
</tr>
<tr>
<td>Negatively impacts external customer satisfaction</td>
<td>48%</td>
</tr>
<tr>
<td>Results in lost revenue</td>
<td>48%</td>
</tr>
<tr>
<td>Slows or stops production</td>
<td>42%</td>
</tr>
<tr>
<td>Hurts brand image</td>
<td>40%</td>
</tr>
<tr>
<td>Negatively impacts sales’ performance</td>
<td>38%</td>
</tr>
<tr>
<td>Hinders strategic decision making</td>
<td>33%</td>
</tr>
<tr>
<td>Impedes product development</td>
<td>31%</td>
</tr>
<tr>
<td>Don’t know</td>
<td>2%</td>
</tr>
<tr>
<td>Other</td>
<td>1%</td>
</tr>
<tr>
<td>None of the above</td>
<td>1%</td>
</tr>
</tbody>
</table>

Base: 389 global IT decision-makers


Although “softer,” business impacts such as damaged customer satisfaction or brand image are business critical in an ever increasing electronic business world. Consumer companies’ competitors are just one click away and even business to business vendor selection criteria now often include online responsiveness in a due diligence or strategic sourcing analysis. And an impact on strategic decision making or R&D impedes an enterprises agility – an important business imperative which is supposed to be accelerated by IT not obstructed.
Manage Application Performance Holistically

As enterprise IT organizations mature their service management processes and improve the coordination of their service management metrics with the lines of business, they begin to realize that the performance of IT is based on the performance of business applications as viewed by end users. Individual, technology silo-based performance characteristics are required for analytical purposes but the only relevant performance meter is how the complete system is perceived by application users.

Outside-In Service Management

This outside-in view requires new processes and even organizational changes. Many enterprises have created a “front-office” department to understand and communicate the business perspective into the IT organization. They create new job positions to facilitate discussions with business users and help IT to understand the service quality from the business perspective. These jobs have different titles across the globe: Forrester calls them Relationship Managers and their role is to understand business requirements on an operational level (not business process planning or architecture) and relate these requirements to the details of applications and IT infrastructure management. In addition, tools are required which collate the consolidated performance data from all infrastructure silos and reflect the full complexity of current application environments.

All too often, it is still that case that application performance issues are discovered and reported by application end users. In the survey, 64% of the respondents say that they usually become aware of issues only when end users report problems to the help desk. Another 34% were confident that alerts from infrastructure management tools were helping them to identify issues. To compound the situation, it is frequently not possible to replicate the user’s complaint by finding an associated fault in an infrastructure component – the classical scenario still prevails: a group of server-, network-, database- and application-managers all claiming that their component is not at fault while the end user is adamant that something is wrong.

To establish more business-centric SLA metrics, IT operations staff must begin to understand their services from the outside in. They must spend time with the business users and understand how they, the users, perceive the service and document what is important for business success or failure. Companies in this phase of service management usually focus on the quality of service around business applications. They need to analyze and document the dependencies between business applications and the details of IT infrastructure in order to better triage incidents or understand true business impact of pending performance or capacity issues.

Only The End-User Experience Matters

The application performance that matters is therefore the response experienced by end users: how long they wait for an online transaction to confirm, or wait for a report or dashboard to populate their display or when a batch job is scheduled and completed. The survey therefore included a question asking whether the companies are measuring the end user experience as part of their application performance monitoring processes. The purpose of the question was to determine the usage levels of products that monitor IT services from the end user standpoint. This is an important emerging technology and the available products represent a broad range of possibilities, depending on the IT service protocols and the type of monitoring used. There are two fundamental solution types:

- **Active agents, which are also called robots.** An active agent emulates an end user by sending a fake transaction at predefined intervals. This technology usually derives from load testing products and is mostly used in Web site monitoring services.
• **Passive agents, which listen to real transactions.** These products come in a variety of forms. They can be desktop-based, server-based, or appliance-based.

Although the vast majority of respondents in this survey (87%) claimed to have such a tool in place, 47% of the respondents still agreed that end users often report that applications are slow even though their monitoring tools say that everything is okay. This is because many enterprises only use application-specific monitors as their end user experience monitor and do not measure the true, end-to-end experience which includes database, network (including the Web), and server performance.

**Become More Proactive**

Responding to end-user reported incidents is a purely reactive process. IT is then faced with at least three customer satisfaction challenges:

• **Incident closure.** IT must identify the root cause and fix the issue as efficiently as possible.

• **Change conflict avoidance.** IT operations tend to fix even application performance incidents with infrastructure configuration changes. They do not have enough information to analyze the code design or data model which is often the more likely root-cause. Selected and provisioned under time pressure, configurations changes often cause new incidents to occur because the infrastructure change affects another application or service.

• **“Why don’t they know about this?”** A general aspect of customer or user dissatisfaction with IT is the apparent reality; that IT does not seem to know what is happening on their watch. Users have the impression that they themselves are IT’s primary monitoring system.

An application performance management team which is able to understand the end user perspective and monitor the application environment based on the end user experience will provide a much more proactive service to the business. The tools employed should identify problems and alert IT to pending breaches or poor performance before the users are affected. The application team should be able to understand business priorities and the business context when handling the incident and setting priorities.

**Improve Your Troubleshooting Capabilities**

It is also important to be able to isolate the true root cause of pending or actual problems in the infrastructure. Many application performance management tools are now able to provide an analysis of application performance behavior broken down by technology silos, assisting the application analysts to isolate performance bottlenecks (client tier, specific databases, network, etc.) based on data gathered by the tool. This will help to avoid the war room scenario described by many of the survey respondents as the tool supports a more rapid and accurate fault domain isolation. The tools support a further diagnosis and troubleshooting process by analyzing performance within the identified fault domain, as each domain requires different analysis parameters.

**Optimize Application Performance**

The analysis parameters should also enable application administrators to review the details of the transaction performance of an application environment. With a tool that can automatically discover, measure and report poor performance elements in an application, highlighting critical bottlenecks, analysts are able to optimize the end user experience in a proactive manner. IT operations staff who can identify problems before there is a user impact are providing true proactive support.
Summary And Forrester Recommendations

The survey results reviewed in this paper provide an assessment of IT’s progress in service management, based on the nearly 400 enterprises interviewed. The main findings from the survey are:

- The increasing complexity of application environments provides management challenges
- Poor application performance incurs severe downtime cost among other business impacts
- Most enterprises would profit from an investment in better application performance monitoring, including the end user experience

Apply Business Level Agreements Not SLAs

The current understanding of service management and service level agreements are clearly defined and controlled today only from the IT point of view. There is little alignment of service management objectives to those goals assigned to the business. Business users perceive their service quality, as delivered by IT, from the behavior or the business applications with which they interact. So application performance management should be the foundation of agreed levels of service delivery. However, while it may be possible to set these acceptable levels (ideally in a dialogue with the business users) it continues to be challenging to monitor these levels from the end user perspective. It is also difficult to prioritize service impact and to analyze the true root cause of application problems.

In today’s business environment, where companies run thousands of business applications in parallel including usually hundreds of Web applications, application support teams shoulder a greater responsibility than their domain expert colleagues but are often not equipped with sufficient information or tools to be able to provide a similar quality service. They lack the end-to-end visibility of business transactions and cannot provide a proactive service to business users.

They require tools that can collate, analyze and predict application performance at the transaction level across all production environments; an enterprise typically has a mix of mainframe, Web-based, J2EE, .NET and client/server platforms in production. These tools must enable the application performance professionals to be able to:

- Proactively discover pending performance issues (before the user does)
- Isolate the root cause of application issues to the fault domain by drilling-down from business service level to configuration item
- Provide relevant data to application development professionals to aid fault isolation

An application performance monitoring tool, including end user experience monitoring is the ultimate judge of IT and business alignment in term of: Availability; Performance; Usability; and Accuracy. Only with the use of these tools, plus the associated organization, will IT be able to be proactive in their service support and provide a holistic view of application performance.
Appendix: Methodology

In March and April 2008, Forrester Consulting conducted an online survey of 389 technology decision-makers who are actively involved in service level and application performance management. This custom research was commissioned by Compuware and conducted independently by Forrester Consulting, and the identities of the respondents were not shared with Compuware. Forrester designed the survey instrument and interview questionnaire in collaboration with Compuware.

The research sample included 153 North American companies with more than $1 billion in annual revenues. The sample also included 67 respondents from China, 59 from France, 55 from Germany, and 55 from the United Kingdom—all with at least $500 million USD in annual revenues. The responding companies represented a mix of industries. All of the respondents were manager-level and above with insight into decisions involving the key areas included in this paper.