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Enterprise Network Management

J. Banks, J. Brown, E. Kimble, J. Sachsel

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Organizational Impact of an

Enterprise Network Management Solution

Using NetIQ’ s AppManager

University of Maryland, University College

Adelphi, MD

Team J3E Members

Jeffrey Banks

Jeremiah (Pep) Brown

Evelyn Kimble

Jeffrey Sachsel

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Abstract

As 21 st century organizations depend more heavily on their information

technology departments for critical business functions, management of IT resources

becomes a serious strategic concern. New solutions for monitoring, allocating and

troubleshooting IT resources are developed with enterprise-wide information systems in

mind. One of these tools is NetIQ’ s AppManager. The intent of the research is not to

tout the benefits of any particular software package, but rather to describe the

functionality of an all-encompassing solution to enterprise network management, and

analyze the benefits similar software tools can provide to an organization. The following

report will provide evidence that implementation of an enterprise network management

solution is essential to improving critical business processes of organizations that

depend on efficient operation of their computer systems.

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Introduction to Enterprise Network Management

The role of an IT department is to ensure availability and performance of

business-critical systems and server applications. Throughout IT departments

distributed systems management is considered an essential ingredient for the

successful deployment and maintenance of these systems. The ability of IT personnel

to manage an entire enterprise-wide networked environment from one remote location

greatly increases their strategic value and productivity. Solutions such as AppManager

provide automation of repetitive network management tasks, monitoring of system

resources, automated fault detection and alerting and pro-active error correction

functionality. Another advantage provided by AppManager is the ability to store and

analyze data describing the state of the networked environment. These services

provide IT personnel with the information and control necessary to ensure transparent

management of an organization’ s networked resources.

According to Stallings and VanSlyke (1998) the International Organization for

Standardization (ISO) suggests 5 categories that are essential to proper network

management. These categories are configuration management, fault management,

accounting management, performance management and security management. Each

of the 5 management categories have unique characteristics that cover a wide range of

business processes related to the use and availability of an organization’ s networked

assets. They are also interrelated in a way that a change in one area of management

can have an effect on any or all of the other categories.

Configuration management facilitates the continuous operation and

interconnection of networked assets. Control of the relationships between system Enterprise Network Management

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components is addressed at this level (Stallings and VanSlyke, 1998). The ability to

redefine default component attributes to enable improved information processing is

critical to the efficiency of the enterprise. Configuration management is closely related

to fault management since it is often necessary to reconfigure sections of a networked

environment to bypass component weaknesses or errors.

Fault management is the ability to detect, isolate and correct abnormal network

operations. Upon detection of a fault or component failure it is necessary for several

events to occur. The network must be isolated from the fault to allow continuation of

service without interference. The network must then be reconfigured or modified to

minimize the impact of the fault. Finally, the failed component must be repaired or

replaced in order to restore the network to its initial state (Stallings and VanSlyke,

1998).

Accounting management is the establishment, monitoring and distribution of

charges for use of networked resources. This is strictly an internal management

function of developing charge-back algorithms, identifying inefficient or abusive

resource usage and updating business plans that address resource allocation or

network expansion (Stallings and VanSlyke, 1998).

Performance management is concerned with monitoring the behavior of and

communications between networked components. By comparing network performance

statistics to an established baseline, situations can be identified as areas of present or

impending performance degradation. It is imperative to identify and correct potential

performance bottlenecks before they cause problems for either internal or external

customers (Stallings and VanSlyke, 1998).

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Security management involves the protection of sensitive data and equipment

from unauthorized users. Businesses with a presence on the Internet are particularly

concerned with unauthorized access to data and network components (Stallings and

VanSlyke, 1998). Access control, data encryption and user authentication are the three

areas of concern when providing protection for network resources and user information.

An enterprise network management solution must address these 5 categories

efficiently in order for a business to profit from its implementation. Functionally, a

network management system should perform the following tasks in support of the 5

management categories:

· Collect Statistics on Communications and Network Activities

· Store Statistics Locally

· Respond to Network Control Commands

· Send Messages About Network Operations to the Network Control Center

(Stallings and VanSlyke, 1998)

The effective performance of network management tasks, application of network

management software, monitoring and analysis of collected management data and

application of that data to support strategic business goals is extremely beneficial to

organizations that are dependent upon IT resources for critical business functions. With

support from executive management, organizations can realize benefits that include

improved business processes, more efficient use of IT resources and increased

productivity within the IT department.

NetIQ Biography

NetIQ is a leading provider of e-business solutions management software. The

company provides application service providers (ASPs) with comprehensive

infrastructure management solutions encompassing application directory, server and Enterprise Network Management

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network performance management. NetIQ AppManager software helps organization

optimize the performance and availability of their Windows NT and Windows 2000

based systems. NetIQ is the first company to offer solutions that encompass system

administration, data center operations management and network performance

management.

NetIQ was established in 1995 to address the need of a strong Internet economy

and provides system and management solutions for the Windows NT environment.

NetIQ is privately held company with over 100 employees. The company is

headquartered in Santa Clara, California with personnel in Houston Texas, Raleigh,

North Carolina, and Bellevue, Washington. It has additional field offices in Washington

D. C., Dallas, Denver, New York, Chicago, London, Tokyo, and Sydney.

NetIQ is comprised of three distinguished companies collaborating to provide

eBusiness solutions and infrastructure management software. One these is Sirana

Software, Inc. of Bellevue, WA. Sirana’ s specialty is the development of web-based

enterprise analysis and reporting solutions for Microsoft BackOffice. Sirana Software,

based in Bellevue, Washington, builds web-based enterprise analysis and reporting

solutions for eBusiness applications like Microsoft Exchange and BackOffice. Sirana

Software delivers decision-making information to business and technical managers to

help them better understand and improve the performance of these important systems.

The addition of Sirana Software continues NetIQ’s strategy to provide a complete range

of solutions for Windows 2000-based eBusiness software.

The second company in the NetIQ family is Mission Critical Software. Mission

Critical is a leading provider of systems management software for Windows NT and Enterprise Network Management

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Windows 2000. MCS is based in Houston, Texas, and operates regional offices in the

U. S., Canada, and Europe.

Mission Critical Software, Inc. recently acquired Ganymede Software. Ganymede

is located in North Carolina is the third member of NetIQ strategy. Ganymede products

provide for the end-to-end testing and monitoring of enterprise networks.

According to Mark Mager (1999) NetIQ has a very direct and unabmiguous aim

to focus its development resources on application management products running under

Windows NT/Windows 2000 systems. Its target customers are typically Global 1000

organizations that include Dell, Shell, Boeing, Phizer, BBC, Philip Morris, Adidas, Glaxo

Wellcome, Lloyds and Roche. Mager’ s (1999) report for the Butler Group estimates

future NT server deployments to exceed 2 million by the end of 1999, and exceed 2. 5

million by the next year. These figures are based on the fact that 1. 6 million NT servers

were deployed in the 3 years preceding 1999 with a reasonably constant increase

between those 3 years.

AppManager Software

NetIQ’ s AppManager is a comprehensive systems and application management

suite of products. According to Mager (1999), it can manage and monitor performance

and availability of distributed Windows NT/2000 systems and server products from

either a central location or from remote locations. AppManager provides an enterprise-wide

view of an organization’ s entire networked environment. With some customization

it can automatically perform a great number of network management functions with little

or no input from the network manager except for some up-front configuring. Enterprise Network Management

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AppManager is a robust enterprise network management solution that is able to

address the 5 categories of network management described above.

AppManager’ s multi-tier architecture is key to the robustness and scalability of

the management solution. As a networked environment expands, different tiers of the

architecture can be deployed at appropriate levels of the network to afford optimal

monitoring, processing and fault correction techniques. With AppManager’ s logically

deployed functional objects distributed across an entire network, monitoring, processing

and managing tasks are organized and efficiently executed. These functional objects

make up AppManager’ s 4 tiered architecture. The multi-tiered architecture provides

flexibility in distributing the process load across multiple networked components and

allows for efficient communication between components.

The first tier is the management console. This object is the primary interface

(GUI) between network administrator, AppManager and every object, either hardware or

software, connected to the network. It is from the console that pre-programmed

monitoring functions, known as knowledge scripts (KS), are configured and executed.

These scripts are written in Visual Basic for Applications, and are the business rules for

collecting and reacting to performance and event data. From this console, and by using

either supplied or customized knowledge scripts, the network administrator can address

the 5 categories of enterprise network management described above.

The second tier is the repository. It is a Simple Query Language (SQL) server

database that serves as the AppManager data repository. It stores all of the information

about the network to include configurations, knowledge scripts, events or alerts, graphs Enterprise Network Management

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Figure 1. NetIQ AppManager’ s Multi-Tier Architecture

and information returned from running knowledge scripts. The repository communicates

directly with the console and the third tier, the management server, using Open

DataBase Connectivity (ODBC).

The third tier, the management server, is the interface between the fourth tier,

management agents, and the repository. The management server distributed

knowledge scripts to their intended locations from the repository. It also directs

monitoring and event data returned from execution of knowledge scripts to the

appropriate locations in the data repository. The management server communicates Enterprise Network Management

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with the management agents using Microsoft’ s Remote Procedure Call (RPC)

technology.

The fourth tier is the management agent. This object can reside on any Windows

NT managed client and is used to monitor associated system and application resources.

The agent executes knowledge scripts that are either directed by the console or

scheduled in the repository. Upon completion of the requested script execution, the

agent communicates any relevant data or events collected back to the management

server. The agent can operate independent of control in the event of a network outage

between the management server and the agent. The agent will continue to collect and

store data, monitor objects and applications and execute knowledge scripts locally until

network services and normal network operating conditions are restored.

An additional advantage of this fourth tier is the ability to follow Liebmann’ s

(2000) “ Follow the Sun” advice for battling increased management costs. Instead of

running second and third network management shifts to cover a 24-hour monitoring

period, agents can be installed at any location on a WAN, essentially monitoring an

internationally distributed network around the clock. Front line management

responsibilities are spread across the enterprise and data can be uploaded to the main

console for analysis during regular business hours.

A typical event that is initiated by the administrator to perform any type of

monitoring or processing function on the network proceeds as follows.

· At the management console, the administrator configures and executes the

knowledge script based job, initiating communication with the repository

· The repository sends the proper configuration and knowledge script to the

remote management server

· The management server sends the job to agents connected locally Enterprise Network Management

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· The agent executes the knowledge script, returning data requested by the

knowledge script back to the management server

· The management server sends the agent’ s data to the repository where it is

logged and stored

· The repository sends the saved data to the console where real-time graphs

and data analysis is updated with the new information

One can observe that the scalability of this architecture is very flexible. With the ability

to locate distributed repositories anywhere in a large enterprise network, the managing

team is able to scale the solution from a small network with servers numbering in the

teens to a large distributed network with hundreds or even thousands of servers.

An optional fifth tier, the Web management server, provides a set of Active

Server Pages that communicate with the repository. This tool aids the administrator by

allowing access to the network from any location equipped with a web browser,

eliminating the need to provide full-time (24/7) network management staffing. Liebmann

(2000) writes in Network Magazine that the effectiveness of network managers

increases when they can get the information they need about network status at any time

or place when their pagers go off. Liebmann (2000) also states that web based

management tools help avoid platform specific hardware requirements associated with

complex network architectures.

Finally, according to Mager (1999), organizations with ever increasing

investments in a Windows NT based computing infrastructure, and those contemplating

a move to such a topology, will require increasingly sophisticated application and

network management and monitoring solutions to “ ease the administrative burden.” A

product such as NetIQ’ s AppManager, that eases the administrative overhead and

lowers costs while delivering efficient and superb functionality, is a “ prime candidate for

serious consideration.”

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Business Cases

Southern Company Services, Inc. (Southern) supplies electricity to eleven million

people in the southeastern United States. It has subsidiaries in South America, Europe,

and Asia. Currently their IT infrastructure is comprised of 600 NT-based systems, and

their main concern is server downtime. Southern searched for a management tool that

would render an early warning and provide automatic error recovery in case of system

problems. Southern is dependent on its information foundation and infrastructure to

support all of its strategic operations, employees, and customers. AppManager allows

Southern to manage the performance, dependability, and accessibility of distributed NT-based

systems. Southern chose AppManager because it integrated well with their NT

systems and provided the functionality they needed to manage a widely distributed

international system of networked resources.

While installing AppManager, Southern was surprised at how immediately

weaknesses were detected within the infrastructure. This has allowed them to make

much needed improvements in the way they operate. AppManager’ s early detection

and warning functions drastically reduced server downtime, provided the tools

necessary to monitor storage systems and quickly reported to IT staffers information

concerning network availability. AppManager also gave Southern the ability to centrally

monitor its vastly distributed NT-based systems.

In the fall of 1997 the National Association of Securities Dealers, Inc. (NASDAQ),

combined with NetIQ to monitor the company’s Web site (Nasdaq. com). NASDAQ Web

handles an extremely high traffic load of over eight million hits per day. The reliability of

Nasdaq. com is paramount for hundreds of thousands of users seeking information, Enterprise Network Management

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stock quotes and other investor services. NASDAQ’ s decision to use AppManager to

manage its web site was made with the intent of improving the reliability and

performance of their Microsoft Windows NT servers. NASDAQ was in the market for a

solution that could “ proactively” manage its web site.

AppManager exceeded all of the stringent requirements NASDAQ had for

monitoring their web site. Before selecting NetIQ and AppManager, NASDAQ decided

to first monitor their web-based infrastructure with custom built fault monitoring

solutions. But as the web grew in popularity, a more reliable and scaleable solution was

needed. As the site grew and hits increased, AppManager’s highly scaleable multi-tiered

architecture could adapt with NASDAQ’ s rapid growth.

Another reason for selecting AppManager, was its ability to store its performance

and event information directly in a SQL Server database. This feature made it easy for

NASDAQ personnel to extract key data for reporting and trend analysis purposes.

NASDAQ discovered another advantage in the fact that AppManager adheres to de-facto

Microsoft standards such as Visual Basic for Applications (VBA) as a scripting

language. This ability gives NASDAQ a method of extending AppManager to meet

specific management needs, without having to learn any proprietary technology.

Harris Corporation is a communications, electronics and information systems

company with more than 27, 000 employees worldwide. Headquartered in Melbourne,

Florida, the company provides a wide range products and services for wireless and

personal communications, digital television, healthcare records management,

multimedia communications, automotive electronics, transportation communications, Enterprise Network Management

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office document management, and defense communications and information

processing.

Harris is a leader in using innovative information technology and actively

participates in trend-setting organizations such as Gartner Group’s Best Practices

Group for automated, “ lights out” Microsoft Windows NT data center operation. The fully

automated facility provides 24×7 computer services to 7, 000 on-line users working in 13

business divisions. Forty-four Compaq ProLiant Windows NT servers bring

manageability, reliability and high performance to the clean-room operation. To keep

pace with growing IT needs, the center is designed and pre-wired to accommodate 110

servers.

Compaq solutions support a unique lights out operation. “ There are no other-lights-

out data facilities in the world that have all Windows NT servers in a fully

automated center,” Bob Reynolds, senior group leader at Harris explained. “ The

servers operate in a dark room, without human intervention. All necessary

management and troubleshooting functions are done remotely. The data center has no

consoles, and the only time people enter is during regularly scheduled outages, which

take place once or twice a month, and only for a couple of hours, or when atypical

problems occur.”

Streamlining and consolidating performance management functions in the new

facility was a project priority. Harris selected NetIQ’s AppManager to provide single-piont

monitoring of all Windows NT operating systems, Microsoft BackOffice services,

application functions and server hardware components in the data center. NetIQ’s

management software is tightly integrated with Compaq Insight Manager. Enterprise Network Management

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“ Compaq Insight Manager is integral to our operation,” says Reynolds. “ We use

it to feed NetIQ alerts, which then feed our HNM network management product. Insight

Manager give us the appropriate alerts, so we know when something happens and can

start corrective action immediately rather than wait until one of our internal customers

notifies us that something is wrong.”

Gary Drack, Project TNT Program Manager states, “ Having these two products

work seamlessly together was a clear win for Harris.” Dave Jensen, Director of Harris’

Windows NT Corporate Data Center touts the efficient operation by stating, “ Our backup

capability is outside the room and we have a build and-repair area and certification

center outside of it. This allows us to apply a strict set of rules and discipline to the

server environment, which, in turn, allows us to provide the world’s best service.”

MicroStrategy is an international organization. It supplies DSS (decision support

system) software and other associated services throughout the world. MicroStrategy

combined Dell servers and storage solutions along with AppManager as a tool to

manage their software system. This combination aided in enhancing system

performance and dependability benefits, heightened productivity, and improved

competitive advantage.

MicroStrategy has used Dell OpenManage for sometime now. OpenManage is

very useful when managing servers, especially Dell servers. Because MicroStrategy

uses a distributed server network (worldwide), it needed a system not only to effectively

manage their remote servers, but also to manage the entire infrastructure.

They incorporated NetIQ’ s AppManager with Dell OpenManage. Using these two

tools together allowed MicroStrategy to watch the performance and accessibility of the Enterprise Network Management

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programs in their system. AppManager uses an event driven communication that is

automated. This allows the necessary parties to be notified, which allows for an

expedient solution to the problem. AppManager works very well with Dell OpenManage.

Scripts are used to allow MicroStrategy to observe and manage their servers.

One of the main reasons MicroStrategy adopted AppManager was to improve

customer satisfaction with customers being any person who works for MicroStrategy.

They now have the capability to issue “ internal Service Level Agreements” to the whole

organization. These agreements guarantee uptime and minimum response times.

AppManager has allowed MicroStrategy to increase the reliability of their server

infrastructure. Without AppManager MicroStrategy would not be able to maintain the

level of reliability they currently have, and systems reliability has a direct impact on

MicroStrategy’ s bottom-line.

Glaxo Wellcome (Glaxo) is headquartered in the UK. It is one of the world’ s

largest pharmaceutical companies. Glaxo wanted to replace17 of their global

messaging systems with an operative alternative. They decided on an NT-based system

employing MS Exchange Server. They implemented an AppManager solution because

it allowed them to combine the system management components in one place, which

includes the management of Hewlett Packard Net Servers. It gave Glaxo the same

monitoring capabilities mentioned in the MicroStrategy case.

In this case AppManager was to work specifically with MS Exchange. The

implementation of the Exchange servers and AppManager was a $28. 8 million dollar

project. It covered seven different places in the UK and a number of Exchange servers Enterprise Network Management

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all over the world. Now Glaxo has 50, 000 Exchange users, 15, 000 of which are based

in the UK, the center of operations.

AppManager allows Glaxo the power to effectively and economically manage

their global network. The integration of the global messaging system has greatly

increased efficiency. Support elements at Glaxo now have the capability to remotely

make repairs. As a failsafe, AppManager’ s early detection facility will alert an engineer

of a system problem. Glaxo also implemented internal Service Level Agreements much

like MicroStrategy.

The BBC implemented what they call their Internal Digital Infrastructure (IDI)

project, at the steep price of 70 million pounds. IDI includes email services with internal

and external messaging via the Internet. There are thousands of messages per hour,

so they needed something to make sure the messaging foundation could handle that

amount of traffic. The BBC chose AppManager.

The BBC considers itself a pioneer in the digital broadcasting arena, that being

their reasoning behind a sizable IT investment. The project entailed converting from

Novell to NT and using a Win95 desktop and Exchange/Outlook messaging system.

AppManager was the tool of choice because of its integration possibilities, central

management prowess with NT-based systems and sever programs to include Lotus

Domino, performance optimization, and its automated problem detection.

Three networked NT servers were used to test AppManager while the prototype

network was in final beta version, over a period of six days of continuous running. The

BBC concluded that the system proved to be very stable and any minor technical issues

were quickly addressed and cured in the final version. They began the actual Enterprise Network Management

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implementation using some non-critical Exchange servers allowing them to train the IT

staff, and implement at the desired rate. The BBC has approximately 50 Exchange

servers, serving about 7, 500 users. The number of users increases at approximately

200 users per day.

The Defense Intelligence Agency (DIA) purchased AppManager licenses for

every Exchange server on its classified network because it wanted to monitor how many

messages were going inside and outside the agency, the number of massages per hour

on each server, and identify high volume users. AppManager provided that information.

DIA tested AppManager on operational systems. This allowed DIA to configure its

Compaq ProLiant 6500 servers for their Exchange users and all of their data.

Operations managers started out using the basic monitoring tools in NT and Exchange.

Shortly thereafter, they went to full implementation of AppManager. As the other

organizations have stated, AppManager give them the flexibility and scalability to locally

manage a widely distributed network.

Relationship to the Service Profit Chain

Increasing customer and job satisfaction by empowering employees to perform

their duties using the best tools available is important to the Service Profit Chain.

Heskett addresses this issue specifically in his final comments where he states that the

means by which successful organizations ensure growth, high profit levels and future

success is by increasing levels of customer and employee satisfaction and loyalty, and

by enabling the continuance of outstanding service delivery. The business cases

presented above are examples of organizations providing exactly those key factors Enterprise Network Management

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through the use of innovative technology to manage and improve their information

technology services.

Figure 2. Heskett Service Profit Chain

The improvement of information processing services provided by the IT

department has a net effect on the entire enterprise. As service availability and

performance improve, employees are better able to serve their clients. Employees who

can better serve their customers, both internally and externally, become more satisfied

with their performance. Frustrations that accompany network and application problems

disappear. Organizations that provide for customer access to their computer networks

increase the value of their products when information and services requested by their

clients are dependably and efficiently delivered. With the overwhelming increase of

eBusinesses and eCommerce, an efficiently managed network leads to satisfied

customers, suppliers and employees.

Both MicroStrategy and Glaxo Wellcome provide internal service level

agreements to their in-house customers. These agreements guarantee a certain Enterprise Network Management

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availability and functionality of the IT infrastructure. As employees come to depend

upon a certain level of service from their information systems, they become more

confident in their ability to perform the tasks assigned, and increase the level of their job

satisfaction, as well as improving the quality of service to their customers. As described

in Heskett (1997), the level of customer loyalty, or intent to repurchase services,

increases exponentially with respect to customer satisfaction. And customer loyalty is

key to increasing the lifetime value of a service and increased profitability within a

competitive industry.

For Web based organizations, like NASDAQ above, and businesses that perform

critical business functions using Internet technologies, the ability to monitor, analyze

and improve the performance of public network hardware and software services is a key

advantage. As the information and communication flows within the organization,

delivering vital services to internal and external customers, the value of the service

increases, correspondingly increasing customer loyalty and satisfaction. Revenues

generated by this increased profitability are then “ pumped” back into the IT

infrastructure to further improve the system.

Finally, in Heskett (1997) the USAA case is a good closing example of using

information systems to empower employees and deliver the highest quality service

possible. Heskett (1997) states that USAA outpaces their competition in investing in

information systems. This gives USAA’ s employees the ability to provide services to

their clients resulting in some of the highest customer satisfaction and loyalty levels in

the industry. Additionally this accounts for increased levels of job satisfaction among

USAA employees. Although USAA does not implement the specific software solution Enterprise Network Management

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described in previous sections, it does demonstrate the strategic advantages to

providing both internal and external customers with the best tools possible that will

increase the value of services rendered.

Conclusions

The advantage gained by using enterprise network management tools can

be beneficial to an organization with substantial monetary and strategic investments in

information technology. With the expansion of the Internet and the drive toward

eBusiness/eCommerce, the ability to monitor and respond to complex internal and

external customer demands is essential. As techniques and tools improve the delivery

of services to the vital customer base, improvements in the quality and value of the

services improves resulting in growth and profitability.

As Heskett’ s Service Profit Chain shows, the success of a service organization is

dependent on many factors relating to the value and quality of the services provided.

NetIQ’ s AppManager empowers information technology professionals, giving them the

ability to increase levels of service, meet the ever-increasing internal demands for

information and processing power, and provide external customers with around-the-clock

satisfaction. As the business cases have shown, many large international

corporations have not only invested in a system to improve internal processes, but have

initiated their investments because of a need to serve their customers better than the

competition. Strategically, this is a win-win situation, satisfying an organization’ s

internal requirement to improve the service delivery system while, at the same time,

providing customers reasons to remain loyal to a business dedicated to quality, value

and satisfaction.

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As 21 st century organizations depend more heavily on their information

technology departments for critical business functions, management of IT resources

becomes a serious strategic concern. New solutions for monitoring, allocating and

troubleshooting IT resources are developed with enterprise-wide information systems in

mind. One of these tools is NetIQ’ s AppManager. The intent of the research is not to

tout the benefits of any particular software package, but rather to describe the

functionality of an all-encompassing solution to enterprise network management, and

analyze the benefits similar software tools can provide to an organization. The following

report will provide evidence that implementation of an enterprise network management

solution is essential to improving critical business processes of organizations that

depend on efficient operation of their computer systems.

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