# PERFORMANCE MANAGEMENT

IT Utilization Competency Through Comprehensive Capacity Planning

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## PREFACE

From the early days of the Information Technology age, the industry has changed from a centralized, monolithic mainframe that was shared by all departments, to every department having their own fleet of smaller, single and multi-application clusters. The number of servers a company has running its core applications has increased by a factor ranging from hundreds to tens of thousands. With this explosion of servers came a flood of supporting cables, network and storage devices, followed by thousands of copies of Windows and/or UNIX/Linux and management tools, further compounded by the proliferation of e-mail, digital scanning, content management, data warehouse, ERP, CRM, BI, BSM, and other functions now primarily designed and administered by IT. The resulting complexity has become immense and has driven IT organizations to a variety of remedies including virtualization, grid and Cloud Computing, outsourcing, and the search for varied system management solutions that will bring clarity to their IT environments.

During this time of expanding IT and deepening complexity, the foundations of business have also changed. Customers interact directly with corporate applications via the web. Expectations in the business environment have changed from the buyer having to wait on the seller to provide customer service or product information, to the buyer receiving direct access to information. If the buyer's desires are not met they simply click their way to a more responsive seller who will provide the level of service they expect. In the B2B environment, responsiveness of key applications can mean the difference between being awarded or losing millions of dollars in the open market. B2C customer loyalty is only as good as your last transaction or service reply. The end result is an ever-increasing level of competitiveness with little or no forgiveness if a company guesses wrong on what technology is required to stay competitive.

Guessing is not an option, yet, guessing is exactly what many IT organizations do to varying degrees when they do not have the ability to gauge how existing IT resources are being utilized and what resources will be required in the future to meet application growth and net new applications. The tools and skills needed to answer these questions fall into the IT discipline of performance management and capacity planning. This paper will provide insight on why these disciplines are vital to the competitiveness of today's technology-enabled corporations.

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## INTRODUCTION

Business agility is governed by the degree to which IT and business metrics are linked, providing a solid and factual foundation for strategic and tactical decision making. The core business includes such items as inventory levels, historical revenue patterns, and opportunity pro formas. The IT side of the equation provides items such as application peak-load requirements, disk usage patterns, and modeled business scenarios. Business agility empowers a company to quickly exploit opportunities as they arise, improving competitiveness, revenue and market positioning. One of the primary enablers to business agility is the disciplines of performance management and capacity planning. These long established disciplines have deep roots in their ability to provide the metrics supporting the IT side of the equation. Yet these disciplines, while viewed as important, have been labeled discretionary in some cases or altogether ignored.

## IT PROCESS MATURITY LEVELS

| Level | IT Process Maturity | Description of Management Processes Implemented |
|---|---|---|
| 4 | Value | IT and business metric linkage, use of management and business application data to improve the business process, enhanced cost recovery |
| 3 | Service | Capacity planning, end-to-end IT service-level management |
| 2 | Proactive | Performance management, change management, problem management, configuration management, automation, job scheduling, availability management |
| 1 | Reactive | Basic event up/down, console management, trouble ticketing, basic backup and recovery, inventory, basic topology |
| 0 | Chaotic | Multiple unconsolidated help desks, user calls notify status, nonexistent IS operations (operations are the responsibility of those deploying the IT asset) |

Source: IT Operations Management Is Undergoing Transformation - Gartner Research, LE-20-1550

The genesis of the “discretionary” and “altogether ignored” view is multi-faceted. While in 1999 Gartner Group established both performance management and capacity planning as key indicators of IT process maturity, Moore’s law of chip density and thus increased processor speeds combined with high speed memory and low-cost server design encouraged IT managers to simply throw hardware at performance and capacity problems. Unfortunately, while throwing hardware at a problem can provide a quick fix, the unintended consequences of chronic over-provisioning are not usually considered in the equation.

Complexity is the invisible multiplier of cost and risk. For every piece of hardware added to an IT environment, complexity is increased. With hardware comes physical complexity in the form of cables, power, redundancy and peripherals; and logical complexity in the form of software management, workload balancing, logical fail over and systems management. Each of these components represents additional capital and operational cost. Physical hardware ties to the capital expenditures (CapEx) and support/management costs to plan, implement, and maintain an environment go directly to operational costs (OpEx). OpEx is some multiple (2-5 or more) CapEx, and is not only an ongoing cost but also ever-increasing.

Risk is factored by complexity due to the increased opportunity for component failure and human error.

The levels of cost and risk any company will tolerate across an enterprise are finite. If risk and cost are higher in IT, then it must be lower in some other portion of the company to counter the impact. Unlike many parts of a corporate structure, IT can proactively reduce cost and risk by reducing complexity. Unfortunately for reasons noted above many companies are still in the mode of resolving performance and capacity issues by adding hardware and thus increasing complexity. Is throwing hardware at a performance or capacity problem without understanding the affect on the complexity portion of the equation the answer? The general response is no; hardware is the answer when it is determined through informed analysis of the alternatives that it is the best answer. Informed analysis is done by identifying the root cause for the perceived need for additional processor power, storage or incremental capacity. This identification process is based on established performance management and capacity planning disciplines, allowing an organization to understand if tuning an application, re-balancing workloads, improving storage system responsiveness, re-configuring a portion of the network, or adding additional hardware is the answer.

Complexity will never go away completely, it is part of the IT and business equation. Minimizing complexity and placing it under the control of the enterprise (instead of it controlling the enterprise) will directly contribute to a company's overall competitiveness. Control is obtained through a holistic knowledge of the IT environment, providing peace of mind and an ability to make strategic decisions based on solid factual foundations. Knowledge is obtained through performance and capacity management tools capable of providing a multi-platform enterprise view and understandable analysis and answers concerning the IT environment.

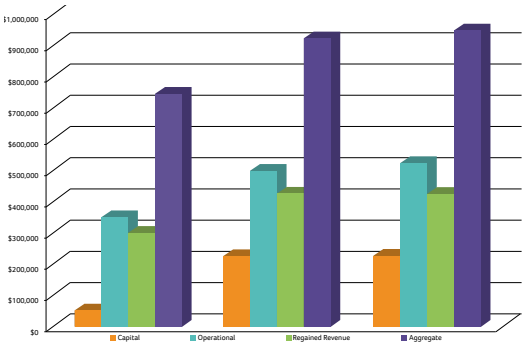


Figure 1

By minimizing complexity and controlling its impact a medium size IT environment of 500 Windows servers could benefit by as much as $2,500,000 over a three-year period (Figure 1). While results will vary, the core concept of controlling complexity through accessible and easily understood informed analysis of the environment remains on a solid foundation. The following sections provide a detailed discussion on how complexity is tamed, and by business component the types of benefits that should be expected through the implementation of a sophisticated, yet easy-to-use performance management and capacity planning package such as ASG-TMON® PA.

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## PERFORMANCE MANAGEMENT AND CAPACITY PLANNING – A BUSINESS PERSPECTIVE

The framework from which all benefits of performance management and capacity planning flows can be found within the following three pillars:

- Competitive advantage – Ensuring all necessary hardware and software resources are available and sufficient to support business requirements in a manner that maximizes revenue.
- Customer satisfaction and retention of customers – In today's "no wait time" environment, applications must run flawlessly or customers/prospects will find alternative means to meet their objectives. Reduced customer/ prospect satisfaction translates over time to reductions in revenue, customer base, and in relation to an in-house IT organization, potential outsourcing.
- Maximize return on capital/operational IT investment – The ability to do more with the same resources or less is directly linked to an organization's ability to compete. Capital is the lifeblood of an organization, and like the human body the blood goes to the area of most need. If IT cannot improve productivity and maximize its investment dollars, then dollars that could be targeted for other endeavors must be redirected to IT to maintain service quality required for acceptable levels of competitiveness.

The disciplines of performance management and capacity planning are at the core of all IT operations and the majority of IT and business decisions. The remainder of the paper is dedicated to how performance management and capacity planning impacts such areas as business agility, time to market, customer satisfaction, and overall competitiveness.

## BUSINESS AGILITY

Mergers and acquisitions are not only common but expected these days as shareholders demand growth in earnings. There are many factors that go into M&A analysis. One of the factors is the ability to absorb the new business into the existing infrastructure and achieve efficiencies of scale desired to reduce cost. IT has been and will remain, a critical component of that equation. If a CEO is considering a potential merger or acquisition, it is likely the CIO will be asked for input to aid in creating a sound foundation for the decision matrix. Companies equipped with sophisticated, yet easy-to-use performance management and capacity planning tools can quickly assess risk and impact of additional applications and workloads. These IT organizations can model various scenarios ranging from parallel operations to sharing of common applications to integration to consolidation. The CIO must be equipped with a full range of informed analysis and recommendations, and as a competent contributor to the company's executive team, can provide the valued input to ensure a solid foundation exists for a go/no-go decision. The example above could just as easily be applied to entering into a new market segment or expanding an existing market segment. In today's information-based business environment, the CIO plays a critical role in the business decision process and requires informed analysis of IT resources based not just on a point in time but on historical trends and projected outcomes.

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## COMPETITIVENESS

The questions that should be asked prior to any capital acquisition are:

- How does this make the company money?
- How does this save the company money?

How does this make the company more competitive in the market?

If the acquisition cannot adequately answer one of these questions with a compelling response, then the acquisition should be shelved or flat out rejected.The third question: “Competitiveness,” can be hard to quantify, but if viewed through the filters noted below it becomes much clearer:

- Time to market
- Cost containment or deferral to allow for investment in other areas of the company
- Improved productivity leading to higher levels of customer satisfaction, more orders processed per hour, more efficient customer support calls and better asset utilization
- Increased business agility generated from a solid foundation of knowledge concerning IT capabilities, thus the ability to make strategic and tactical decisions swiftly and with ease
- Reduced IT complexity and resulting reduction in overall risk. Because most companies have an established level of risk that they are willing to carry, reduction of risk in IT allows the company to take more aggressive action in other areas of the business

Competitiveness is the sum of all these things plus intrinsic value such as “First Mover” and/or improved brand awareness that is hard to assign a consistent value. Competitiveness must be viewed through the lens of the damage that can be done to a competitor, plus the good will and revenue that can be gained through its effective use.

## TIME TO MARKET

Time to market can represent millions of dollars in the drug industry. FDA approval is a long and tedious process requiring hundreds of hours of modeling and the processing of statistical data. Understanding the performance and capacity characteristics of these environments is critical to ensuring successful runs of complex programs which may take days to complete. Only through sophisticated, yet easy-to-use, performance management and capacity planning tools, is this accomplished.

This scenario is one of many where products are being designed, and sufficient compute power is critical to trumping the competition. First-mover advantage aids market and brand leadership, revenue, profit (first mover traditionally gets to charge more for some period of time), and market share. Performance and capacity management is a critical IT component ensuring IT does not become the bottleneck standing between first mover or responding in a timely manner to a first mover.

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## PRODUCTIVITY

Productivity in IT terms means one of two things:

- The amount of work traversed by the complete IT infrastructure or a subset therein
- The amount of work traversed by the IT organization, a group within the organization, or a specific individual.

Sophisticated, yet easy-to-use performance management and capacity planning tools allows for improved productivity in both of the noted areas.

From the operational perspective, automation of traditionally time consuming and sometimes rather complex performance management and capacity planning tasks will substantially reduce human intervention and human error. Add into this equation an ability to interpret data into information and model (forecast) future requirements based on past trends or known, upcoming business conditions, and the stage is now set for an huge leap in infrastructure management productivity. How many people would it take today and how much time, in a 1,000-server environment, to gather processor and storage data from each server, reduce the data into concise and compact packets and then translate these packets into understandable information for executive management, IT infrastructure management, performance analysts and capacity planners? A large staff, and many staff-hours later, a result would be obtained and then the work of validating that human error did not slip into the process must be conducted. After it is all said and done it is time to start the process again for next week's or next month's data.From a capital perspective, improved utilization (productivity) translates directly into obtaining more processing and storage capability out of every resource. An average Windows server farm has a server utilization of 10-15 percent, with wide disparities between the servers. If, over a period of a month, the server administrator(s) noted that there is little day-to-day variation, it would not be unreasonable to assume that some of the servers could be consolidated, allowing fewer servers to accomplish the same amount of work in a shared application environment. With each reduction in the number of servers, comes savings in deferred hardware, software and labor. The same can be said of the storage side of the house, but perhaps with greater savings. It has become increasing difficult for IT teams to keep track of their total storage utilization and performance, especially in geographically distributed environments. Sophisticated performance management and capacity planning tools can bring clarity to a complex environment by being able to group servers by department, application, server type, storage type, or any other criteria. One person can view and understand the system requirements for terabytes to petabytes of information. Armed with this information, a significantly reduced number storage administrators can quickly identify areas of low usage, bottlenecks or configuration deficiencies (hardware or software). Performance and capacity management can return large amounts of storage resources while improving overall customer satisfaction by lowering their cost while improving their performance.

## CUSTOMER SATISFACTION

The connection between customer satisfaction and performance/capacity management is typically not understood. An unbalanced or over utilized system will result in poor customer satisfaction. The most robust applications will lose their value if they cannot meet minimal levels of responsiveness and throughput. Independent of the customer being a captive (in-house) or external audience (service provider relationship), dissatisfaction will lead to either poor productivity, replacement of IT management, reduced competitiveness and revenues, loss of a percent of existing customers and lower levels of customer acquisition. Customer satisfaction is what performance management and capacity planning are all about. Each IT application needs to understand its customers and their expectations, and seek to exceed expectations. It is difficult to exceed service expectations if the only measure of your success is the number of complaints received. Not only is this a poor measurement but, with the Internet, it is made even more inaccurate and dangerous because people just go to another site without leaving a trace that they were ever there.

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## CUSTOMER SUPPORT

Optimization of customer support improves customer satisfaction, increases revenue, and lowers operational costs. Transaction throughput and server responsiveness are keys to optimization. Informed performance and capacity analysis provides the insight to ensure all access points to customer service are running at maximum efficiency.

An exceptional example of the value of optimized customer support would be FedEx. Early in the web's evolution, FedEx realized it could give its online customers access to its tracking systems and significantly reduce the cost of customer support. This lowered operational cost by leveling out or reducing customer support staff requirements, associated system, and HR requirements to support larger support centers; reduced capital cost through lower requirements for customer support stations, networks, infrastructure, and servers; improved customer satisfaction levels; and increased revenues through the empowerment of the customer to check on the status of their packages day or night without human intervention thus improving their overall experience, translating into more packages shipped via FedEx.

## CUSTOMER/EMPLOYEE TRANSACTION RATES

Customer/employee transaction rates could be equated to blood pressure, but in the inverse. The higher the rate the better, and just like blood pressure, it must be regularly monitored. From a business perspective, transactions are the source of life, without transactions there are no product orders, inventory, or customers. Customer satisfaction hinges on transaction response time; too slow too often, results in lost customers. It all goes to the bottom line and overall profitability.While real-time monitors are key in indicating if a heart attack is occurring, historical performance and capacity analysis are the key metrics in understanding if the system is likely to have a heart attack, stroke, or aneurysm. Performance and capacity analysis can provide a clear picture from a multitude of data points. How long are critical business transaction systems waiting for resources? What key transactions are not meeting their SLAs and why? How can I optimize my environment to ensure I can handle spikes and be prepared for unplanned functionality or applications? The answers to these questions will determine customer satisfaction and retention, current and future revenue, higher inventory turns and improved productivity.

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## BUSINESS SYSTEMS AVAILABILITY AND RESPONSIVENESS

What is the cost of an outage? While outages are rarely caused due to lack of performance management and capacity planning, resource shortages or degraded applications, can and are, impacted by the lack of informed analysis and clarity in the areas of performance and capacity disciplines.

Imagine that XYZ company has a major stock trading or order-processing application running 40 percent degraded. If this is one of the main revenue generating applications, a 40 percent degradation can translate into 10 percent of lost business due to customer dissatisfaction. Note, this does not account for reduced customer acquisition due to an unsatisfactory application experience or loss of existing customers. Moving on with the example, if the application generates $50,000/ hour in revenue the 10 percent reduction translates into a $5,000/ hour loss. Add this to the unaccounted customer/ prospect loss potential and the numbers begin to add up. With a sophisticated, yet easy-to-use performance management and capacity planning tool, resource shortages/degraded performance can be anticipated and planned for in advance. If the XYZ company was able to avoid two of these instances a year and if each occurrence was to only last for 2 hours, a well designed performance management and capacity planning tool could provide a benefit of $20,000/year. This is before any other component of the value proposition is taken into account.

## BUSINESS SYSTEM ABSORPTION AND COMPETITIVE RESPONSE FACTORS

For each IT operating environment, different disciplines have evolved to ensure a sufficient server and/or storage cushion was available to absorb spikes or unplanned usage. Spikes represent a small but important component of overall capacity. The spike cushion is the ability to absorb business activity at critical junctures. An inability to absorb spikes will result in reduced customer satisfaction due to a belief the application or company is not up to the task at the most important moments to the user. The result is loss of customers due to an unsatisfactory experience (especially if it occurs multiple times), and loss of potential new business due to impatience to stay with your application during times of reduced responsiveness.

The other side of the cushion equation is unplanned usage. It is not uncommon for new features or applications to be added expeditiously in response to competitive challenges. Many times these new features/applications are moved into production well before expected or they were never planned for in the first place. On-line brokerage firms are excellent examples of this heavy-trading-day phenomenon since they frequently deal with spikes and unplanned usage:

- Usage spikes are no secret in the brokerage industry. Billion-share days were exceptions at one time, but now are common. During the transition between pre- and post-billion-Source: OTC Bulletin Board share days, some brokerage firms reeled as their pre-billion-share systems tried to cope with the additional workloads. Once billion-share days were identified as being a reality, firms added additional cushion to ensure sufficient systems resources to absorb that level of work. The hardware cushion initially staged was not sufficient to absorb the unexpectedly high spikes in stock trades. Companies that anticipated billion-share days modeled their environments and pre-installed sufficient resources to absorb the modeled workloads, these companies were the big winners in relation to the billion-share issue because their systems never lost a beat or missed a stock trade.Schwab, a market leader in on-line brokerage, can impact competitors with new features or applications. In the world of finance, time is of the essence. If a Schwab competitor knows their own capabilities in regard to performance and capacity; is knowledgeable of historically how their systems

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respond to change; can model quickly the effects of a new variable; and knows what future requirements are in the wings and their projected effects; they are better prepared to fight against aggressive competitors such as Schwab and to deal with unplanned usage caused by new functionality.

Another more generic example would be if a CEO states their company will not only fend off a competitor but will surpass them; the CIO is now on the hot seat of delivering the IT infrastructure to make that increased transaction rate a successful event, as opposed to a disaster. With sophisticated, yet easy-to-use, performance and capacity management tools, any company can quickly evaluate what needs to be put in place beyond their previously approved IT plan. Without this informed analysis, the CIO and his/her staff are shooting in the dark, which in many cases leads to overbuying (more complexity). This is a costly approach and does not ensure success. Without informed analysis of an environment, stress points in the infrastructure are not exposed, workloads are likely to be out of balance, and the day an application goes into production is not a day of confidence built on a solid foundation of information, but rather a day of hope built on a foundation of "did we throw enough hardware at the problem to survive." This can translate into tens of thousands to millions of unplanned Capex spending over a short period of time depending on company size. Intelligent performance and capacity management allows companies to "Seize the Day" and places them in the position to crush their competitors.

## TECH ASSET UTILIZATION

Why has IT abstraction (virtualization/cloud) remained the hottest trend for more than a decade? There are a variety answers, starting with complexity reduction and quickly moving to IT resource utilization and operational and capital cost reductions. Having 40 servers within a 200-server environment or 400 servers within a 2,000-server environment running at an average of 15 percent processor utilization (not uncommon) with only 40 percent storage utilization; could be viewed as a waste. Not only are these resources not running close to their capacity, but they are also incurring additional software cost, utilizing expensive real estate, electricity, environmentals, and systems management, and ncreasing risk and cost via complexity. Modeling what would happen in a consolidation allows consolidation planners to build on the solid foundation of informed analysis.

Another consolidation benefit is improvements in configuration and application management. Let's look at configuration management first. If an application is providing unacceptable response times, the data center has two choices: throw faster, better hardware at the problem (storage, memory, processors, etc) and hope it resolves the problem, or evaluate where the problem exists through performance management tools that can bring clarity to the vast complexity of IT performance. This analysis, in many cases, reveals the root cause versus hiding it with an abundance of hardware, increasing complexity. Additionally, on the capacity management side of the equation, the problem could have been proactively detected and remedied; eliminating the problem before it ever impacted the business.

Applications, which is after all, the main reason for IT in the first place, number either hundreds or thousands depending on the enterprise. Many enterprise IT environments have hundreds, if not thousands, of applications running at any one time. The ability to holistically view the application environment and make tactical decisions on where to place applications has become a Herculean task. It is important to step back, historically view the environment and, through informed analysis, make tactical application processing decisions based on a solid foundation of information. With dynamic provisioning, the need for performance management and capacity planning has grown since it is incumbent upon IT to view the environment as a whole and plan as if it was one large resource. With regard to application capacity, the rule is to manage locally but plan centrally. Another component of application management is placement

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of new applications or how to service additional processing requirements of existing applications. In many cases, an enterprise may have sufficient existing hardware resources to meet current and near-term requirements, but without effective central planning, these resources are never identified, thus over buying will occur to expeditiously meet new and/or expanding workloads.

Performance management and capacity planning tools provide the insight and clarity to ensure balanced IT environments with maximized utilization of available IT resources.

## SOFTWARE COST CONTAINMENT

Over the past ten years there has been a movement towards workload-based pricing and capacity on-demand, and over time more users will be benefiting from a utility pricing model or Utility License Charge (ULC). Utility License Charge (ULC) is akin to your light socket; you plug in the light and use what you need. It is also similar to the early days of cell phone usage where you had to watch your minutes to avoid steep expenses if you ran over your quota. The enterprise is becoming increasingly aware of the need to understand application and systems utilization. Through sophisticated, yet easy-to-use capacity management tools like the ASG-TMON® PA series, users can determine through modeling how a specific software usage option may affect them, placing them in an improved position for discussions with their vendor. Users will also be able to validate that they are being billed correctly for current and previous utilization, identify opportunities to optimize their environment (such as zIIP speciality engines) to lower usage cost, and model the future. This equates to clarity in budget projections, cost containment, and the ability to have a checks and balances methodology in place to ensure ULC is billing correctly.

For vendors, such as IBM, that offer capacity on demand server engines, the ability to analyze and model the environment is critical. Without this capability, the "capacity on demand" feature becomes "upgrade on demand." The saved capacity will rarely be returned because the data center will have no hard evidence that the need for the additional capacity was an anomaly. Informed analysis through performance management and capacity planning tools will allow enterprise IT environments to leverage creative software and hardware options due to its ability to track and forecast usage.

## IT VENDOR MANAGEMENT

Conventional thinking is that a vendor's focus is to separate a customer from as much of their money as possible as quickly as possible; and the focus of the buyer is to obtain as much value as possible for as low a cost as possible. The reality is that most vendors want a truly satisfied customer and to provide what they require, and the majority of customers are more than willing to pay for quantifiable value and service. One of the major keys to the equation is knowledge. If a customer can clearly communicate their requirements based on informed analysis, the vendor is now provided the criteria upon which they can base their solution and can demonstrate their quantifiable value. This process removes much of the second-guessing a vendor goes through to ensure they are providing enough of an offering/product to generate a satisfied customer. For the customer, information (not data) prevents scope creep, vendors are kept focused, discussions are contained to the facts based on informed analysis, not what the vendor or customer would like to portray as the facts to improve their position. The end result is improved vendor/customer relationships, shorter and more productive procurement cycles, and the customer acquiring what they need to be successful based on a clear methodology and informed analysis instead of guesswork. In economic terms, this translates into targeted software and hardware contracts based on solid information and the customer being in a strong position to ensure the acquisition of IT assets are on a financially beneficial "just-in-time" schedule.

## SUMMARY

Performance management and capacity planning, once the domain of statisticians and technicians is now inextricably linked to corporate competitiveness, agility, and revenue. Technology has invaded every corner of worldwide commerce and is a potent weapon when joined with critical information on how it is currently being used and deployed, and how it can be used and deployed. Through agility gained by clear and understandable IT performance and capacity data, a company can gain market share, neutralize a competitor and significantly improve revenue and profits. Analysis has shown how a 500-server environment can generate between $200,000 and multiple millions in savings and recovered revenue based on the use of ASG-TMON® PA as a performance management and capacity planning tool.

The case has been made based on the varied areas of business these two disciplines can affect. It is time to move on the information and use it as intended, as a weapon of business.

Through ASG's depth of industry knowledge, and its ASG-TMON® PA offerings, we empower businesses small or large to fully exploit the benefits discussed in this paper. ASG-TMON® PA tools span the wide array of IT environments providing a single point of contact to manage Windows, UNIX/Linux, and z/Architecture environments. ASG can quickly have any company on the road to benefiting from the points discussed within this paper, with little to no disruption.



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