The Mandate to Implement Unified Performance Management

1. Executive Summary

In most companies there is a gap between the needs of the Business Unit Managers and the perceived value of the services provided by the company's Information Technology (IT) organization in general, and the IT infrastructure organization in particular. This disconnect has a negative impact on both the performance of the Business Units as well as the perception of the IT function.

This paper develops a set of ten "principles", the purpose of which is to both describe the factors that cause this gap, as well as to make concrete suggestions as to what the IT function can do to better market the value of IT. Those principles are:

1. Only a small percentage of IT infrastructure organizations have successfully marketed the business value of the services that they provide.

2. In spite of all of the interest and the rhetoric, only a small percentage of companies have experienced great success with their service level management deployment.

3. Business Unit Managers are much more likely to find value in the applications they use rather than in the IT infrastructure.

4. In order to market the value of the IT infrastructure, IT organizations must be able to show the linkages between the performance of the IT infrastructure and the performance of key applications.

5. The complexity inherent in many applications and IT infrastructures necessitates the requirement to gather management information from a multitude of data sources and to aggregate this information without loss of visibility.

6. Network organizations will not be able to successfully market the value of IT if their approach to performance management is to "throw bandwidth" at the problem. In order to be successful, network organizations need to understand all of the various factors that limit performance.

7. The factor that has the greatest impact on a company's ability to successfully market the value of IT is their ability to do effective service reporting and management.

8. Effective service reporting and management is difficult to do primarily because of clutter; i.e., too many disparate sources of management data, as well as too many stove-piped performance management tools that do not provide actionable data.

9. In order to ensure the performance of the applications that are important to Business Unit Managers, IT organizations must implement Unified Performance Management.

10. A critical component of Unified Performance Management is the creation of a Unified Data Model.

Unified Performance Management refers to a new approach to performance management that enables IT organizations to:

- Gather management data from multiple sources on a wide range of traffic types and applications and use this data for all service reporting and management

- Eliminate stovepipes and have all of the relevant performance management tools be able to access a Unified Data Model

- Get reports that both identify a potential problem as well as provide accurate, actionable data

A Unified Data Model is a data repository that:
- Provides consistent metrics; i.e., availability and utilization

- Maps to all sources of management data

- Supports all traffic types

- Avoids normalization

As evidenced by the comments of one of the network professionals who was interviewed as part of the research that was performed to create this paper, there is reason to believe that Unified Performance Management will soon be a reality. He stated his belief that some of the historical impediments to effective performance management, such as the lack of a Unified Data Model, will soon be eliminated and that he will soon be able to better manage his company's networks and servers.

2. Marketing the Value of IT

In most companies there is a gap between the needs of the Business Unit Managers and the perceived value of the services provided by the company's IT organization in general, and the IT infrastructure organization in particular. Throughout this paper the phrase "IT infrastructure" refers to the combination of networking, computing, and storage.

This disconnect has a negative impact on both the performance of the Business Units as well as the perception of the IT function. In particular, this disconnect has:

• Limited the success of the Business Unit Managers

• Caused the IT function to be viewed primarily as a cost to be minimized vs. being a strategic component of the business

The goals of this paper are to both describe the factors that cause this gap, as well as to make concrete suggestions as to what the IT function can do to better market the value of IT.

As part of the research that was done in order to create this paper, Ashton, Metzler & Associates interviewed a number of IT organizations. As is common in our industry, these companies do not want to be referred to by name. Because of this, throughout this paper these companies, and the individuals that were interviewed, will be referred to as:

Company	Individual
The Insurance Company	The Insurance Professional
The Entertainment Company	The Entertainment Professional
The Financial Services Company	The Financial Services Professional

In order to quantify how the IT function is perceived, Ashton, Metzler & Associates recently surveyed hundreds of network professionals. The survey respondents were asked whether or not the company's Business Unit Managers regarded their company's network as being strategic.

The results of this survey indicate that virtually every company regards networking as being strategic. However, in most cases when people say that the network is strategic what they mean is that the network is very important. Less than fifty percent of the companies that were surveyed believe that their network infrastructure helps them to compete in the marketplace. Of those companies that do believe that their network infrastructure helps them to compete in the marketplace, less than half of them can use the business value of the network to justify an investment in the company's network.

Principle: Only a small percentage of IT infrastructure organizations have successfully marketed the business value of the services that they provide.

The need for IT organizations to market the value of IT will steadily grow. This follows because on a going forward basis, business success will increasingly depend on the ability of the IT organization to at least meet, and in many cases anticipate the needs of the company's Business Unit Managers.

In order to both anticipate and meet the needs of their company's Business Unit Managers, many IT organizations have begun to deploy service level management. Ashton, Metzler & Associates recently surveyed network professionals to quantify their approach to service level management. The results of that survey are depicted in Figure 1.
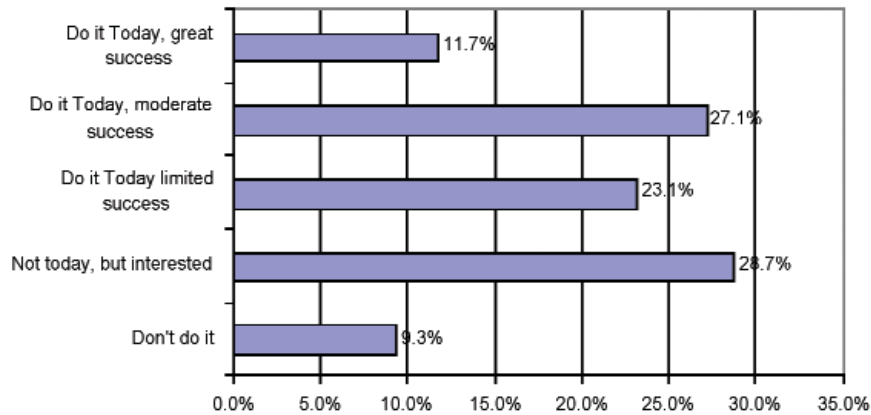
Figure 1: Interest in Service Level Management

One conclusion that can be drawn from Figure 1 is that virtually all companies are interested in deploying service level management. However, it is also possible to conclude that successfully deploying service level management is quite difficult.

Principle: In spite of all of the interest and the rhetoric, only a small percentage of companies have experienced great success with their service level management deployment.

All of the companies that were interviewed as part of the research that was performed to create this paper agreed that a Business Unit Manager typically perceives the applications that they use to be more valuable than the network that supports those applications. The Financial Services professional elaborated on this perception. He commented that the Business Unit Managers within his company increasingly view the IT infrastructure as a commodity similar to electricity.

Principle: Business Unit Managers are much more likely to find value in the applications they use rather than in the IT infrastructure.

One of the implications of the preceding principle is that in order to bridge the gap between the Business Unit Managers and the IT organization, the IT organization must be able to manage both the applications and the IT infrastructure.

The Financial Services Company is in the process of clarifying and highlighting the linkages between the IT infrastructure and company's key applications. In particular, the company is part way through a major deployment of service management. As part of this deployment, the IT infrastructure organization will be offering multiple levels of service for the services that they provide. By offering multiple levels of service, the IT infrastructure organization enables the company's Business Unit Managers to make trade-offs between business parameters such as cost, and infrastructure parameters such as throughput and availability.

Principle: In order to market the value of the IT infrastructure, IT organizations must be able to show the linkages between the performance of the IT infrastructure and the performance of key applications.

Regrettably, it can be extremely difficult to demonstrate the linkage between the performance of the IT infrastructure and the performance of key applications. Part of this difficulty comes from the complexity that is inherent in contemporary applications as well as in many IT infrastructures. For example, today many applications do not use a well-known TCP port, but rather use a range of TCP ports. In order to understand the performance of this type of application, it is necessary to gather usage information from a variety of data sources.

Typically motivated by the desire to improve availability, the IT infrastructure has also become increasingly complex. For example, in order to improve the uptime of a server, many IT organizations have implemented server load-balancing. In an attempt to improve the uptime of a Wide Area Network, IT organizations typically implement a variety of techniques; i.e., redundant links, fast fail-over protocols. Understanding the usage of a network with this type of complexity requires the ability to gather management information on each component of the network, as well as the ability to aggregate this information without loss of visibility.

Principle: The complexity inherent in many applications and IT infrastructures necessitates the requirement to gather management information from a multitude of data sources and to aggregate this information without loss of visibility.

3. Effective Service Definition

Whether or not an IT organization formally implements service management, the successful marketing of the value of IT requires an IT organization to develop better relationships with the company's Business Unit Managers. In order to build these relationships, an IT organization must achieve two key goals. The first goal is to create a set of Effective Service Definitions. The second goal is to implement Effective Service Reporting and Management.

The process of creating Effective Service Definitions entails having the network organization define network services that visibly impact the success of the users of those services, such as the company's Business Unit Managers. Effective Service Definition is a critical activity for IT organizations because the only way that IT organizations can successfully market the business value that they provide to the company's Business Unit Managers is by offering services that the Business Unit Managers recognize as enabling them to achieve their goals. Note that a key part of the definition of a network service is the identification of a few key performance metrics.

In this context, "network services" seldom refers to technologies such as Ethernet, ATM, or Frame Relay because those technologies typically make sense only to a network organization, not to Business Unit Managers. To successfully deploy Service Level Management, the network organization must define network services in terms that make sense to the Business Unit Managers.

For example, a network organization might decide to offer the following network services:

• Remote access
• Conferencing Services
• Messaging Services
• Internet access

Once the network services and the appropriate performance metrics have been defined, it is incumbent on the network organization to ensure that these services perform as promised. To accomplish this goal, there is a real temptation on the part of many network organizations to "throw bandwidth" at the problem of providing acceptable performance.

The approach of deploying steadily increasing amounts of bandwidth as a way to ensure adequate network performance has two fundamental limitations. One limitation is that this approach is expensive. The second limitation is that this approach will have at best limited success.

In order to understand the cost associated with throwing bandwidth at performance problems, consider a hypothetical company, Acme Inc., that has one hundred branch offices that it connects with a Frame Relay network that is comprised of T1 access links, 128 Kbps PVCs, and 256 Kbps Frame Relay ports. Further assume that in an attempt to ensure network performance, Acme has decided to increase just the size of their Frame Relay

PVCs to 256 Kbps. Based on current Frame Relay tariffs, that change would cost around $220 per month per office. For the entire branch office network, this equates to an increase of $22,000 per month, or slightly less than eight hundred thousand dollars over a three-year life cycle.

Even if Acme was willing to spend the money to continue to increase the capacity of its network, that approach will have only limited success. That follows because computer networks function as a complex system in which the performance of each component of the system can have a significant impact on the performance of the company's key applications.

For example, assume that Acme was willing to spend the almost eight hundred thousand dollars that is necessary to upgrade the capacity of its Frame Relay network. If Acme makes this decision without accurate and detailed performance management information, it is highly likely that this WAN upgrade will result in little if any increase in the overall performance of Acme's key applications. In particular, Acme's Frame Relay network is only one component of Acme's computer network that can introduce performance issues. Performance issues can also be introduced by a wide variety of other components of Acme's computer network, including Acme's routers and servers.

The Entertainment Professional agreed that focusing on just the performance issues associated with the WAN is short sighted. He stated that his company's IT performance issues often stem from their servers and their applications. He noted that most applications developers, whether they are developers that are internal to his company or who work for large software vendors, do not develop applications in ways that make them easy to manage. His interest in understanding the performance of servers and applications was not defensive; i.e., to convince senior management that the network was not the source of the performance problem. As he explained, it is not acceptable in his company to walk away from a problem just because it is not in the network. The expectation within his company is the IT organization will use performance management to identify and fix problems anywhere in the IT infrastructure before these problems impact the business.

Principle: Network organizations will not be able to successfully market the value of IT if their approach to performance management is to "throw bandwidth" at the problem. In order to be successful, network organizations need to understand all of the various factors that limit performance.

4. Effective Service Reporting and Management

As previously mentioned, Effective Service Reporting and Management is a key component of marketing the value of IT. Regrettably, while there certainly are difficulties associated with Effective Service Definition, there are far greater difficulties associated with Effective Service Reporting and Management.

The painful irony for network professionals is that the reason that Effective Service Reporting and Management is difficult has nothing to do with a lack of sources of management data about the performance of the network, nor a lack of performance management tools. In fact, the situation is just the opposite. As depicted in Figure 2, the current state of network management is characterized by having too much clutter. In particular, Network professionals have a wide array of sources of management data as well as a large number of performance management tools. The problem facing network professionals is the fragmented nature of this management data and these tools.
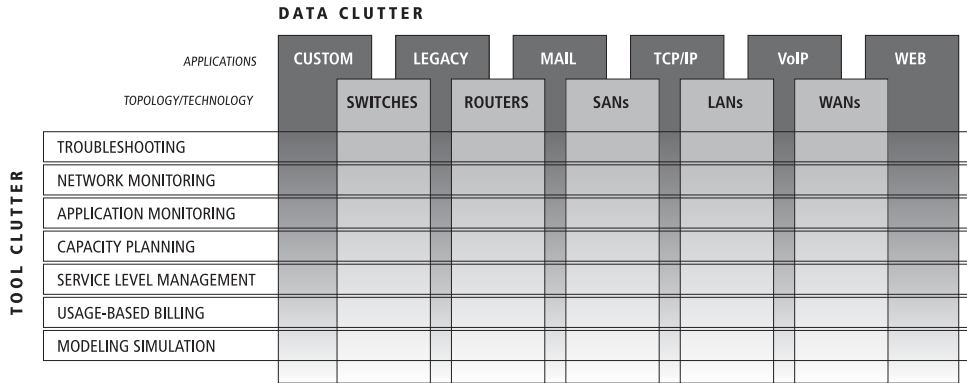
DATA CLUTTER

APPLICATIONS	CUSTOM	LEGACY	MAIL	TCP/IP	VoIP	WEB		
TOPOLOGY/TECHNOLOGY		SWITCHES	ROUTERS	SANs	LANs	WANs		

TOOL CLUTTER

	SWITCHES	ROUTERS	SANs	LANs	WANs	
TROUBLESHOOTING						
NETWORK MONITORING						
APPLICATION MONITORING						
CAPACITY PLANNING						
SERVICE LEVEL MANAGEMENT						
USAGE-BASED BILLING						
MODELING SIMULATION						

Figure 2: Network Management Clutter

As the name implies, Effective Service Reporting and Management refers in part to the ability of the network organization to generate reports for a variety of audiences, including network engineers, senior IT managers, as well as Business Unit Managers.   In order to be of value, these reports must have consistent information and be relevant to the audience.

As mentioned, as part of the clutter that currently characterizes network management, network professionals have a wide array of sources for management data on the performance of their network. For example, management data can be obtained from Acme's Storage Area Network (SAN), Local Area Network (LAN), as well as from Acme's Wide Area Network (WAN). Acme can also gather management data from tools that manage its Web based applications, or from tools that manage its VoIP deployment, or from a variety of other sources. However, each of theses sources of management data has its own independent viewpoint of how the infrastructure or the applications are performing.

In order to understand the impact of all of these disparate sources of management data, assume that the tool that Acme uses to manage one of its key applications indicates that the application is beginning to behave poorly. Because of the independence of the data sources, there is no easy way for Acme's IT organization to find the source of the problem. Instead, Acme must go through a laborious and error prone process in an attempt to restore the application performance to the level that is expected by Acme's Business Unit Managers.

When network managers acquire performance management tools, they certainly expect that these tools will generate canned reports. However, the IT organization has to be able to use reports from these tools to both show the value that IT brings to the Business Unit Managers, as well as to demonstrate that the IT organization is meeting their service level objectives. In order to do this in a way that is relevant to the Acme's Business Unit Managers, the IT organization must be able to supplement the ability to generate canned reports with the ability to easily generate customized reports.

For example, according to The Entertainment Professional, the existence of multiple sources of management data is the biggest factor that inhibits the effective use of performance management. He feels that in order to successfully manage the performance of his company's IT resources, he needs to be able to take all of the management data into a single data repository, independent of the source of that data. He wants to be able to drive consistent reports off of this data repository, as well as be able to correlate the various pieces of management data in order to better understand the performance of his company's computer network.

Effective Service Reporting and Management also refers to the ability of the network organization to manage the performance of the network in order to ensure that the network services that have been promised to the Business Unit Managers are performing as promised.   However, there are three factors that have limited the ability of companies to maximize their investment in Service Management.

Similar to the situation with Service Reporting, the primary factor that has limited the effectiveness of Service Management is clutter. As discussed, management data is available from a number of sources, including Acme's SAN, LAN, and WAN, as well as from tools that manage Acme's applications. In addition, as shown in Figure 2, there are multiple tools to perform each of a variety of management tasks, including:

- Troubleshooting
- Network Monitoring
- Application Monitoring
- Capacity Planning
- Service Level Management
- Usage-Based Billing
- Modeling and Simulation

One impact of network management clutter is that it tends to increase the Total Cost of Ownership (TCO) of running a network. This follows because having a multitude of tools drives up the cost of tool acquisition, of training, as well as ongoing software maintenance.

The second factor that limits the impact of service management is that the vast majority of performance management tools have a stove-piped data architecture. The phrase "stove-piped data architecture" has two meanings. The first meaning is that the scope of the vast majority of performance management tools is limited to just one component of the overall IT solution; i.e., the tool only applies to the LAN, or to the WAN, or perhaps to Web based applications. The second meaning is that management data cannot easily be moved between performance management tools.

The combined affect of clutter and stove-piped data architectures leads to a continued fragmentation of the network management function. For example, assume that Acme is using tools to monitor the performance of their network and their applications, and these tools have indicated that there is insufficient network capacity. Acme would certainly like to take this monitoring data and import it into a capacity-planning tool. However, given the stove-piped data architecture of performance management tools, this is typically not possible. While many companies try to solve this problem by acquiring one or more specialized network management tools, that approach is doomed to failure. For example, Acme can continue to deploy additional tools to manage its network. However, Acme will not get any synergy out of using these tools until the tools have access to a common collection of management data. This common collection of management data will be referred to as a Unified Data Model.

The third factor that limits the impact of performance management is that most performance management tools are designed only to alert the user to the existence of a problem, but not to help resolve the problem. It is very difficult for Acme's IT organization to successfully meet the service level objectives that it has negotiated with the company's Business Unit Managers if the tools they use do not provide any actionable data. For example, assume that Acme is using a tool based on synthetic transactions and that the tool has just alerted Acme's IT organization to the fact that there is a problem with the response time of a key application, but does not provide any actionable data. Using tools such as these ensures that during the time that Acme's IT organization is trying to determine what actions it should take to resolve the problem, that the service level objectives are not being met.

Principle: The factor that has the greatest impact on a company's ability to successfully market the value of IT is their ability to do effective service reporting and management.

Principle: Effective service reporting and monitoring is difficult to do primarily because of clutter; i.e., too many disparate sources of management data, as well as too many stove-piped performance management tools that do not provide actionable data.

5. The Mandate to Implement Unified Performance Management

In order for a company's IT organization to close the gap that exists between themselves and the Business Unit Managers they must overcome the impediments that were outlined in the preceding section of this paper. This means that IT organizations must implement a more unified approach to performance management. In particular, IT organizations must implement an approach that allows them to:

- Gather management data from multiple sources on a wide range of traffic types and applications and use this data for all service reporting and management
- Eliminate stovepipes and have all of the relevant performance management tools be able to access to a Unified Data Model
- Get reports that both identify a potential problem as well as provide accurate, actionable data

For the sake of this white paper, an approach that accomplished the above three criteria will be referred to as Unified Performance Management.

Principle: In order to ensure the performance of the applications that are important to Business Unit Managers, IT organizations must implement Unified Performance Management.

All of the companies that were interviewed as part of the research that was done to create this paper agreed that performance management plays a significant role in terms of how their companies plan and operate their networks. The Financial Services Professional pointed out that the use of performance management has allowed his company to better manage their wide area network and has resulted in significant WAN savings. He also pointed out that as his organization continues to deploy services with differentiated service levels, they will need to make increased use of performance management in order to verify that they are providing the Business Unit Managers the services they were promised.

According to The Insurance Professional, the use of performance management has helped his organization to establish better relationships with the company's Business Unit Managers. He commented that there are two primary ways that performance management is used within The Insurance Company's network: trouble shooting and capacity planning. The Insurance professional also commented that one of the primary limitations to the effective deployment of performance management is that they currently give a "very fragmented view" of their network management data because of the various sources of that data.

The Entertainment Professional described a situation in which the use of performance management was key to solving a performance issue in a critical business application. In particular, The Entertainment Professional works in an IT organization that supports a large casino complex. The casino complex includes a number of retail outlets in a large mall. His company had attempted to deploy a Point of Sales application that would allow players to earn points at the casino that could be redeemed at the stores in the mall. When the application was first deployed, the storeowners were experiencing a delay of roughly seventy to eighty seconds. The effective use of performance management allowed the IT organization to reduce this delay to less than three seconds.

In general, there are three classes of sources of management data. The class that provides the most elementary management data comes from network devices such as routers and switches. This data source provides data link layer visibility across the entire enterprise network and captures parameters such as the number of packets sent and received, the number of packets that are discarded, as well as the overall link utilization. This data can be used for a number of functions, such as elementary capacity planning; i.e., identifying where bandwidth is either under or over utilized.

A more advanced class of management data comes either from industry-standard probes or from switches and routers that support functionality such as NetFlow or sFlow. Whereas elementary management data can be used to quantify overall link utilization, this class of management data can be used to identify which network users or applications are consuming the bandwidth.

The most advanced class of management data comes from probes that are specifically designed to capture this information. These probes capture management data from all aspects of the infrastructure and provide insight into a wide range of well-known, custom, and web based applications. This management data can be used to both measure the end-to-end performance, and report on the response time of critical business applications.

As previously mentioned, one of barriers to the successfully implementation of service management is the combination of clutter and stove-piped data architectures. In order to better support the Business Unit Managers, IT organizations have to eliminate this barrier.

The Financial Services Professional recognizes that the value that performance management currently provides to his company is limited by the difficulty in integrating the various sources of management data. However, he believes that performing the integration of that data in-house is not a viable long-term solution. What is needed is an industry solution that provides the ability to easily capture all three classes of management data in a common format and to allow a wide variety of performance management tools access to this data.

Principle: A critical component of Unified Performance Management is the creation of a Unified Data Model.

The Entertainment Professional is very optimistic relative to the improvements that he sees coming in performance management functionality. He believes that a Unified Data Model is possible and, as previously stated, he sees that the lack of this model as the biggest factor that currently inhibits the effective use of performance management. He has reservations about how soon he will have the ability to truly manage applications, but he is optimistic that new performance management tools will give him the ability to better manage networks and servers.

6. Summary

IT organizations are challenged to continually demonstrate the value that they provide to Business Unit Managers. This challenge is more easily met by the company's applications developers than by its IT infrastructure organization as Business Unit Managers are much more likely to find value in applications than in the IT infrastructure.

In order to respond to this challenge, many IT infrastructure organizations are attempting to deploy initiatives, such as Service Level Management, that position them to more clearly show the value that they provide to the company's business critical applications. However, the successful support of a company's business critical applications requires that the IT organization implement effective performance management. For a combination of technical and economic reasons, throwing bandwidth at performance problems will never result in effective performance management.

In order to implement effective performance management, IT organizations must develop a new approach. This approach, which is referred to as Unified Performance Management, enables IT organizations to:

- Gather management data from multiple sources on a wide range of traffic types and applications and use this data for all service reporting and management
- Eliminate stovepipes and have all of the relevant performance management tools be able to access to a Unified Data Model
- Get reports that both identify a potential problem as well as provide accurate, actionable data

As evidenced by the comments of The Entertainment Professional, there is reason to believe that Unified Performance Management will soon be a reality. He believes that some of the historical impediments to effective performance management, such as the lack of a Unified Data Model, will soon be eliminated and that he will soon be able to better manage his company's networks and servers.

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