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## **VALUE PROPOSITION FOR IBM SYSTEMS DIRECTOR: CHALLENGES OF OPERATIONAL MANAGEMENT FOR ENTERPRISE SERVER INSTALLATIONS**

### ***Economics Benefits for IBM Power Systems Deployment***

#### **Challenges and Opportunities**

The enterprise IT management agenda has grown progressively broader and more pressing. Proliferation of servers has escalated management costs and complexities and has made it more difficult to maintain availability, security, and other key variables of service quality. Low levels of capacity utilization have embedded inefficiencies across server bases.

Growth in data and storage volumes, along with growing diversity of network structures and technologies, has had similar effects in other segments of IT infrastructures. Increasingly, organizations have also had to deal with emerging data center constraints, rising energy costs, and pressures for “green” initiatives to increase energy efficiency and promote environmental responsibility.

Many organizations see such challenges as serious – but manageable. The status quo may be maintained, or incremental improvements may be realized over time.

This view, however, may be based on a fundamental misperception. Inefficient IT infrastructures divert resources from initiatives that could yield higher business returns. The result is a “lost opportunity” cost of potentially massive proportions.

As the research presented in this report indicates, during 2008 more than 76 percent of IT expenditure by the average Fortune 1000 corporation will be on infrastructure resources that deliver, at best, indirect business value. Much of the remainder will be spent on maintaining and enhancing existing applications. Only 7 percent will go into the delivery of new application functionality with direct business impact.

What, then, should be done? The elements of a solution are emerging. Trends in management tools and technologies, as well as new approaches to the organization and management of IT resources at the enterprise level, are combining to define a new opportunity. The potential emerges not only to reduce infrastructure costs, but also to achieve transformational increases in IT effectiveness.

This report deals with one part of this opportunity – the potential to realize major increases in the efficiency of organizational UNIX and Linux server bases through effective, enterprise-wide use of advanced management tools.

Specifically, the report looks at the potential for cost savings through use of IBM Systems Director 6.1 to manage IBM Power servers running AIX, Linux, or i operating systems, or combinations of these. The management capabilities of Systems Director 6.1 extend across the full range of Power server physical and virtual resources.

Savings may be realized in the following areas:

- **Server administration costs.** In six composite profile installations of IBM Power server bases in large organizations, potential three-year savings in personnel costs ranged from \$300,000 to \$7.5 million. The average for all six installations was \$3.1 million, representing a 21.2 percent reduction in server administration costs.

Installations contained 2,531 physical and virtual AIX servers, along with 153 physical and virtual servers running Linux or the IBM i operating system.

Profile installations are for large financial services, insurance, manufacturing, retail, and telecommunications companies, and a government agency. Installations are composites constructed using data supplied by 23 organizations in these industries.

For each installation, three-year costs were first calculated for full time equivalent (FTE) personnel for existing environments. These typically involved use, with varying degrees of efficiency, of a mix of server management tools from multiple vendors. In many cases, manual techniques were employed. Such environments are common in large organizations.

Numbers of FTEs were then reduced based on International Technology Group (ITG) estimates of efficiency gains that could realistically be achieved in each installation through effective enterprise-wide use of Systems Director 6.1 (EESD scenarios). Three-year personnel costs were calculated for the new staffing levels.

Results are illustrated in figure 1.

Figure 1  
**Server Administration Costs for Existing Environments and EESD Scenarios:  
Averages for All Installations**



Savings were due to a combination of factors. These included use of a common, high-productivity administrator interface, additional capabilities not provided by existing Power server management tools, and high levels of integration of management functions and processes across diverse hardware and software resources.

The ability of Systems Director 6.1 to integrate management of Power server virtual and physical resources proved to be particularly significant. FTE reductions and corresponding savings in personnel costs were generally higher where Systems Director 6.1 was employed to manage heterogeneous virtualized environments.

The ability to manage Power servers as well as System x and other x86 platforms, along with distributed disk storage, and (in two installation) System z Linux servers using the same management console and tools resulted in further economies.

Systems Director 6.1 supports integrated management of x86 Windows, Linux, VMware, Microsoft Virtual Server, Xen, and z/VM servers as well as Power-based environments. IBM DS3000, DS4000, and DS6000 low-end and midrange disk systems and RAID controllers may also be managed through this solution. All of the profile installations employed large bases of x86 servers and distributed storage.

- **Energy costs.** Energy consumption was compared for existing environments and EESD scenarios in which Active Energy Manager, an IBM offering forming part of the Systems Director product family, was employed. Three-year energy costs were then calculated for both scenarios.

Potential three-year savings in energy costs averaged seven percent. Savings were particularly significant for newer servers employing IBM EnergyScale technology, for which Active Energy Manager provides closely integrated and optimized management services.

- **Overall impact.** The overall impact of savings in server administration as well as energy costs through use of Systems Director 6.1 in profile installations is summarized in figure 2.

Figure 2

**Overall Systems Director 6.1 Impact on Power Server Operating Costs**

CATEGORIES	SAVINGS	FACTORS
<b>Server administration</b>	Range: 17.9% – 24.4% Average: 21.2%	Reduced full time equivalent (FTE) staffing & personnel costs for server administration tasks
<b>Energy consumption</b>	Range: 2.2% – 11.8% Average: 7.0%	Reduced energy costs through improved monitoring & control of server energy usage
<b>Combined cost impact</b>	Range: 17.8% – 23.7% Average: 20.8%	Combined server administration & energy consumption cost savings

Additional information on profile installations, along with FTE staffing and cost breakdowns and details of methodology may be found in the Detailed Data section of this report.

Cost savings could also be realized in other areas. For example, experience has shown that well-managed server environments typically experience fewer outages. Systems Director 6.1 monitoring capabilities will tend to reinforce this effect by allowing administrators to identify and resolve problems at an earlier stage than would be the case in a conventional server environment.

## Server View

### **Consolidation and Virtualization**

Although industry debates about server management tend to focus on x86 platforms, the UNIX server world also faces major challenges.

Server consolidation remains a priority for many organizations. A growing number of organizations are choosing to consolidate existing small server bases, and deploy new applications by exploiting the partitioning capabilities of latest-generation large and midrange UNIX platforms.

The degree of consolidation that can be realized depends heavily upon two sets of capabilities:

1. **Virtualization.** In order to support heterogeneous application environments on a single physical server, it must be possible to allocate system resources to partitions in a highly granular manner. Mechanisms must also be in place to reallocate resources dynamically and flexibly over time to reflect application priorities and accommodate fluctuations in workloads.

2. **Server management.** Heterogeneous virtualized environments require advanced management tools. Processes such as discovery, monitoring, configuration and event management, software and firmware updates, and energy management must be extended across partitions executing diverse concurrent workloads.

It is from this perspective that the use of Power servers with Systems Director 6.1 should be viewed. Combined, they offer an integrated solution that provides industry-leading capabilities in both areas.

Consolidation ratios of from 20:1 to more than 100:1 are routine among organizations employing earlier generations of Power servers and the older IBM Director product. The capabilities of new IBM POWER6-based servers and Systems Director 6.1 extend consolidation opportunities far beyond what has been achieved to date.

### **Power Server Strengths**

The strengths of Power servers include the following:

- **Partitioning and virtualization.** A single IBM Power server, in principle, can be configured with up to 256 firmware-based dynamic and/or static LPARs, each capable of hosting its own operating system instance. There is no architectural limit to the number of software-based workload partitions (WPARs) that may run on a single server.

Most Power server configurations, in practice, support significantly fewer partitions than architectural maximums would permit. Users nevertheless now have the option of creating partitioned environments that are significantly larger and more diverse than in the past.

PowerVM capabilities also include the Virtual I/O Server (VIOS), which enables sharing of adapters across operating system instances running in multiple partitions, and virtual LANs and virtual disks.

- **Performance and scalability.** Power servers are also industry leaders in per processor and system-level performance and are scalable to 64-way configurations. As a result, exceptionally large numbers of virtual server instances and exceptionally large instances may be supported on single physical servers.
- **Server management capability.** A variety of IBM and third-party management solutions for Power AIX, Linux, and i environments have been widely adopted by users.

Systems Director 6.1, in most cases, is compatible with these. It offers, however, a broader unified solution for management of physical and virtual resources. A common administrator interface and integrated, standardized tools may be employed across all of these as well as across all operating system instances supported for this platform.

Systems Director 6.1 also acts as an overlay to the IBM Hardware Management Console (HMC) and its entry-level variant, the Integrated Virtualization Manager (IVM), which have become industry standards for management of Power server virtual resources. A key benefit is that multiple HMCs and IVMs can be managed transparently through the Systems Director 6.1 administrator interface.

It can be expected that the availability impact of Systems Director 6.1 capabilities will also be significant, particularly in virtualized environments. The ability to monitor and manage PowerVM resources with high levels of granularity will prove increasingly valuable in reducing downtime as numbers of virtual images and complexity of virtual environments expand.

Costs of downtime measured in terms of lost productivity and business disruption will be lower in organizations employing Systems Director 6.1 to manage Power server bases.

- **Energy efficiency.** Power servers incorporate industry-leading features that enable high levels of energy efficiency. These include IBM EnergyScale technology, an embedded feature of latest-generation POWER6-based models that provides advanced thermal monitoring and energy management functions that are exploited by Active Energy Manager. EnergyScale technology and Active Energy Manager are discussed later in this report.

Power servers may also be equipped with the IBM Rear Door Heat eXchanger. This is an inexpensive water-cooled unit can remove up to 50,000 British Thermal Units (BTU) of heat from server racks. A key benefit is that this unit may be attached to existing racks and does not occupy additional data center space.

The combination of Power servers and Systems Director 6.1 offer the broader potential for unprecedented levels of server consolidation, with all of the benefits in reduced infrastructure complexity, improved security and data protection, higher quality of service, and other areas that may result from large-scale consolidation initiatives.

Systems Director 6.1 forms part of a broader portfolio of IBM offerings for integrated management of Power server resources. These include AIX Enterprise Edition and AIX Management Edition, which incorporate Tivoli monitoring, application discovery, and usage metering tools. AIX Enterprise Edition also includes AIX Workload Partition Manager for management of WPAR resources.

## Enterprise View

### **Management Challenges**

For more than a decade, there has been a growing recognition that all components of organizational IT environments have grown more complex and interdependent. It has become clear that full range of IT resources must be managed more effectively at the enterprise level.

The challenges, however, are daunting. Enterprise management capabilities must extend across servers and storage as well as networks, applications, and middleware. They must integrate traditional disciplines such as systems management, operations, asset management, change management, and service-level management, along with increasingly critical security, compliance, and energy conservation processes.

Solutions designed to meet these challenges have been available for more than a decade. However, although effective management systems have often been put in place for specific disciplines and IT resources, in most organizations enterprise-level integration remains a remote goal.

One reason for this is that solutions themselves are often technically complex. Implementation challenges are magnified by the diversity of applications, platforms, and technologies in enterprise IT environments, and by the rate of change in these. Deployment initiatives must also deal with shifting business demands and with the need to create management processes that are highly interdependent and complex.

The most effective approaches have proved to be those that focus first on a subset of IT environments and then build toward broader structures. There are a number of potential candidates for this initial focus. But server bases are the obvious starting point.

In most organizations, servers account for a significantly higher percentage of IT spending than other infrastructure components. Even when they have been physically concentrated in data centers, server infrastructures remain dominated by small machines and diverse operating systems and software versions. Overall capacity utilization is typically the lowest, and downtime the highest for any major IT resource.

Early successes in server management thus offer the potential for larger savings and greater benefits in service quality than is the case for other segments of IT infrastructures. They may also act as a catalyst for, and may materially facilitate the realization of broader enterprise management goals.

### Systems Director Role

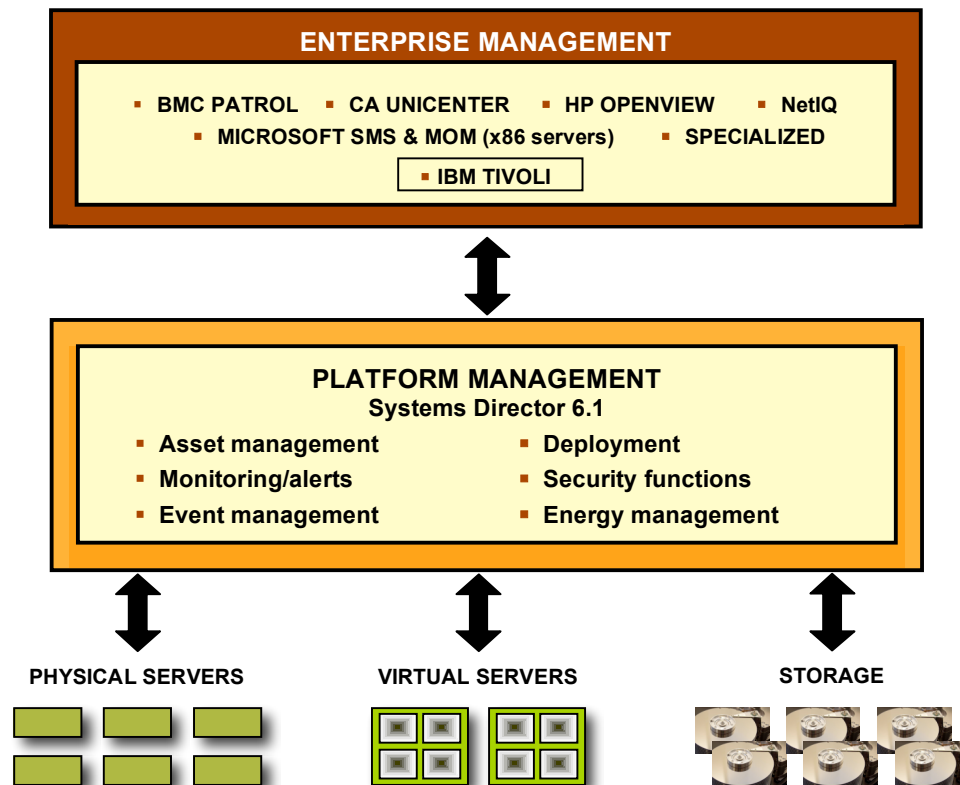
The use of Systems Director 6.1 as a common standard for IBM servers and disk systems offers the potential to address server management challenges in a manner that is highly synergistic with, and can materially facilitate broader enterprise management initiatives.

In this role, which is illustrated in figure 3, Systems Director 6.1 benefits from high levels of integration with IBM Tivoli solutions. Interfaces to third-party enterprise management solutions such as BMC Software's Patrol, Computer Associates' Unicenter TNG, Hewlett-Packard's Open View, NetIQ, and specialized tools are also provided.

For organizations seeking to create server management infrastructures that can later be leveraged to achieve broader enterprise management goals, an initial focus on Power servers offers potentially interesting opportunities.

By wide margins, Power server installations are typically more advanced in use of partitioning and virtualization technologies than their x86 counterparts, and server management tools, practices, and skills are more highly developed.

Figure 3  
Systems Director Relationship to Enterprise Management Solutions



PowerVM capabilities have been adopted by a high proportion of Power server users, and server administrators in many organizations have close to a decade of experience with Power partitioning and virtualization technologies – LPARs, for example, first came into use in 1999.

The potential thus exists to exploit not only the unique strengths of Power servers, but also the skills and experience of Power server administration teams in deploying Systems Director 6.1. As common administrator interfaces are put in place, common “best practice” management processes derived from experiences with Power servers may be implemented for all supported platforms.

With the introduction of Systems Director 6.1, the tools and technologies to realize such gains are becoming available. What is needed now is the ability to recognize and act upon the opportunities that they represent.

## **Additional Information**

This ITG Executive Summary is based upon results and methodology contained in a Management Brief released by the International Technology Group.

For copies of this Management Brief, please email requests to [info-itg@pacbell.net](mailto:info-itg@pacbell.net).



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