

IT consolidation in higher education



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Consolidation provides more cost-effective computing, improved service levels, better security and increased responsiveness.

Executive summary

IT consolidation is an initiative that promises enormous paybacks in higher education. At its simplest, the IT consolidation process centralizes data access and replaces many individual systems and unique processes with common management procedures, resulting in potentially dramatic improvements in equipment utilization and lower operating costs. Consolidation advocates cite a slew of other benefits for IT consolidation, among them greater availability, better and more responsive service levels, non-disruptive growth and the flexibility to rapidly respond to change.

ITCentrix looked at the specific challenges for IT consolidation in higher education, and the potential contribution of HP products, programs and services. Data was gathered from higher education establishments, industry research and sophisticated models of the data center to project cost and benefit.

ITCentrix concludes there should be significantly higher levels of IT consolidation in higher education institutions. This would provide more cost-effective computing, improved service levels, better security and increased responsiveness.

What differentiates higher education from most of the private sector is the greater degree of autonomy that is given to individual schools and departments. This trend has fostered the belief that computing requirements are completely unique for each department. However, today the majority of computing consumed by higher education is highly standardized. Applications such as e-mail, Internet access, student records, desktop and mobile services, and other communication services consume up to 90% of the IT budget. Even unique applications have some common facilities such as networking and database services that can be consolidated. In particular, security is now major concern.

In general, non-profit organizations have been slower than the private sector to adapt to these new realities. The emphasis for achieving the benefits of consolidation in higher education lies in addressing the 90% of budget that is consumed in support of standard computing environments. Common services, processes and procedures need to be provided centrally for these computing elements, as well as a common architecture for computing infrastructure. The overall architecture must be flexible enough to allow freedom of choice of applications, especially in departments using leading-edge IT solutions.

Our research confirms these IT consolidation benefits are achievable within higher education. This paper examines two university cases and unveils the following data points:

- One large midwest university will achieve a 62% internal rate of return (IRR) stemming from nearly \$11M in operational cost savings over a five-year period.
- Savings are primarily coming from a substantial improvement in server and storage management efficiencies with server management leading the way at a 30% reduction in costs required to manage servers.

In a smaller case example (medium-sized university), the following data points were revealed:

- A 53% IRR predominantly derived from more than \$7M in projected cost savings over a five-year period.
- Savings in this case are derived from server and storage management efficiencies underscored by a 25% and 50% reduction respectively in server and storage management costs.

Large and medium-sized universities will see positive impacts on organizational efficiencies, quality of service and the ability to respond to change.

ITCentrix found the main constraints to implementing and achieving such benefits are organizational and cultural. As the CIO of a southern university suggested, "Higher education is ... uniquely independent. Academic freedom they call it." This independence has led to a hands-off culture where decentralization is the rule, not the exception. Fundamental to this trend is the notion that cheap sources of labor such as students can provide services more inexpensively than professional consolidated services and management software. ITCentrix found this thinking to be prevalent in the university environment but believes it to be erroneous.

While clearly, the applications that support (for example) geophysics research versus the business school will be completely different, management and heads of department need to understand that in today's standardized technology world, much of the infrastructure supporting these different applications can be provided by common computing services, such as backup, recovery, network, database and data services. Consolidating such infrastructure allows the department staff to focus on truly unique value-added services, rather than basic "plumbing."

IT departments often have not been given the mission, have not established the trust of their higher education constituents, cannot articulate a clear vision, and cannot provide a clear business case for the advantages of IT consolidation.

This paper has three main objectives:

- 1) To point out the advantages of IT consolidation to higher education institutions**
- 2) To identify where the focus and strategy for IT consolidation is different from commercial industry**
- 3) To quantify the benefits of IT consolidation in general**

To achieve these goals and make the paper more practical than theoretical, ITCentrix has looked at two case studies based on real institutions that both achieved good results from IT consolidation. Our central conclusion is that higher education has been slower than industry to reap the rewards of IT consolidation but that substantial cost reduction and other organizational benefit opportunities exist. By putting in place effective strategies to preserve independence, while at the same time consolidating and coordinating shared services, large and medium-sized universities will see positive impacts on organizational efficiencies, quality of service and the ability to respond to change.

The reasons for IT consolidation in higher education

Much of higher education is currently under financial pressure as the economy has slowed and tax revenues are down. Schools and departments are looking for cost reductions, and IT is no exception.

Consolidation is well established in business as an effective strategy for reducing costs and improving service levels in IT. The business case for consolidation in the private sector is well understood, and a majority of organizations have successfully implemented consolidation projects. Key drivers have been lower costs, improved service levels (availability, security and performance) and improved agility—the ability to introduce new application function more rapidly. Many organizations are now embarking on more advanced consolidation projects, such as application and database consolidation. In all cases, the main emphasis is organizational performance.

Relative to the commercial sector, the reasons for IT consolidation in higher education are similar in principle, but different in emphasis. The major drivers for consolidation in higher education remain cost reduction, availability and security, and responsiveness. However, an underlying theme in universities is a growing realization that managing IT is not a core competency for the faculty of a school or department.

Why do operating costs reduce with IT consolidation in higher education?

ITCentrix has developed sophisticated models of the data center that quantify in dollar terms the reduction in operational costs that can be attributed to IT consolidation. HP uses this model to help IT professionals understand where consolidation makes sense, and where it does not. In many ways, cost is the easiest benefit to quantify: knowing the functionality of new hardware and software, the costs of equipment maintenance, power consumption, floor space used and day-to-day operational personnel used before and after a typical consolidation are relatively straightforward to calculate.

Typically during a physical consolidation when equipment is being moved to a few centralized locations older equipment is replaced with newer equipment. Replacing older equipment can pay many dividends: newer equipment provides greater capacity and performance within the same footprint saving floor space; newer equipment is more power efficient thus reducing electric power requirements, etc. With fewer components, centralization of skills, common processes and procedures, and the use of enhanced systems management software, staff required for IT administration is also significantly reduced, even if the salaries of the centralized staff are higher.

Today, in most decentralized environments each server is used to host a single application and is sized to meet peak workloads that occur infrequently. Frequently processor utilization in these scenarios is less than 30%. Storage utilization, although better, is still only at about 50%. Modern virtualization technologies, such as those provided by HP, offer the ability to deliver additional compute and storage services dynamically. When multiple workloads are consolidated on a single compute and storage complex, there is an excellent opportunity to reduce total capacity since peak requirements for one application rarely coincide with the peaks for others. Thus, consolidating workloads or applications can reduce the total amount of excess capacity that must be reserved.

Based on a relatively small number of user inputs, such as application type, operating environment, number of users and other factors that capture complexity, the ITCentrix consolidation model will determine the number of servers and amount of storage required to host the workload that is being consolidated, and potential efficiency

improvements for support personnel (e.g. gigabytes managed per person). The ITCentrix model also quantifies two less obvious benefits from server consolidation: namely an increase in availability and security, and the ability to more rapidly deploy new applications.

Why does availability and security increase following consolidation in higher education?

Availability and security increases following IT consolidation are likely to come from two sources: 1) improved administration and 2) newer equipment. By far the most important is more uniform and efficient administration. With IT consolidation, data centers will adopt the best procedures for routine maintenance as well as day-to-day operations. In a typical scenario prior to IT consolidation, different sites and departments develop their own timetables and procedures for operations and security as well as server setup. Frequently, especially in smaller departments, individuals with little formal training may administer the computers on an ad hoc basis. In many cases, a distributed site might only have a single partially trained person. If, for some reason, that person is unavailable, the operational tasks fall on an individual with no training or real understanding who has simply been given a recipe to follow. If anything abnormal occurs, the individual is left guessing at what to do next and will most likely guess wrong.

After computers have moved to a central site, availability and security is likely to significantly improve due to professional staff, lack of dependence upon a single individual, and adoption of best practices for administering each platform. The provision of central services such as backup ensures that key data is not lost and recovery of data can be achieved quickly. The uniform application of security patches reduces the risk that omissions of one department will cause havoc for others.

While professional administration and common procedures dramatically reduce outages due to human error and may be the biggest contributor to increased availability, the contribution that newer equipment can make to increased availability should not be overlooked. Newer equipment is designed with a variety of features that can eliminate or dramatically reduce outages associated with hardware failures. Furthermore, when such failures occur, much of the equipment can now be repaired with little or no disruption to ongoing operations. Manufacturers of computer equipment such as HP routinely include redundant components for the elements of the system that are most likely to experience failures such as power supplies and fans. And power supplies, fans and disk drives can be hot swapped allowing operations to proceed normally while the faulty component is replaced.

In today's world, security architectures have to be centralized if they can hope to counter the increasing range of threats. Security of access to data and security

In moving from a distributed environment, application deployment is made easier with consistent naming and management conventions used across the same server platform.

of data have become of increasing concern in the higher education world. The chances of being hacked and of malicious viruses, worms and Trojans go up unless there are common standards and vigilant administration.

Another benefit that may accrue with IT consolidation is the opportunity to deploy clustered servers. With collocated equipment data centers may finally have enough resources on hand to cluster servers to increase availability. Clustering allows two or more servers to provide backup for each other. If one server fails, its workload can automatically be redistributed to the other servers in the cluster. This is particularly important in higher education for services such as database and e-mail services.

How does consolidation contribute to easier and faster change?

Understanding how server consolidation can affect availability is more intuitive than understanding how server consolidation simplifies application development and deployment and ultimately improved agility.

In moving from a distributed environment, application deployment is made easier with consistent naming and management conventions used across the same server platform. Applications no longer have to be customized for specific department environments and the development and testing of application rollouts take less time.

In moving to a shared storage environment (SAN and/or network storage), application development and deployment becomes even simpler. In this environment, all data is perceived as local. Additionally, the application can be deployed on any server in the IT center and the data still remains local. The developer no longer has to be concerned about the complexities associated with retrieving data that is not directly accessible from the server on which the application is running. From a rollout and deployment perspective, it becomes easy to move applications to different servers since there are no data

location dependencies. Easier development, flexibility in application deployment and increased application performance (retrieving data through remote procedure calls over a network is not only complex, it is slow) are major benefits accruing from IT consolidation.

Business value and financial analysis of IT consolidation

Research behind paper

ITCentrix relied on four key inputs for this study, including:

- 1) A review of the HP consolidation offerings
- 2) Interviews with universities that had implemented consolidation strategies to learn what worked and what did not
- 3) The ITCentrix ValueBase, a database of industry cost and productivity metrics
- 4) The IT Consolidation Value Model, a software-based industry model that forecasts the costs and benefits that result from IT consolidation

Methodology used to analyze the customer examples

ITCentrix uses a two-dimensional methodology to assess the impact of IT consolidation on organizations. The method includes a total cost of ownership (TCO) approach that captures a customer's current equipment, software and staffing costs, and projects potential change based on complexity of environment, staff skills and technology deployed.

To evaluate availability and flexibility benefits (so-called “intangibles”), ITCentrix uses a Value Flow methodology that establishes the value of service levels and flexibility to the organization today, and projects potential improvement based on a consolidated infrastructure.

ITCentrix evaluates a business case by taking as a starting point the original distributed environment, and assessing the current costs and current value and then projecting the case for consolidation by forecasting the potential for benefit and the cost of achieving that benefit over a planning horizon (five years for this study).

The process is automated by using the HP ESS IT Consolidation Model discussed above and independently developed by ITCentrix. Use of the model also ensures that inputs are used to create results in a consistent and repeatable manner. As a sanity check, ITCentrix uses ValueBase to compare results against industry averages. More information on the methodology can be obtained from the ITCentrix website (www.itcentrix.com).

Quantifiable benefits from consolidation fall into three main categories:

- **Operational costs benefits:** savings from factors such as increased staff efficiencies, as well as lower acquisition, maintenance, software and space/power/cooling costs

- **Service level improvements:** additional user productivity from higher application availability and costs associated with planned and unplanned downtime and security enhancements
- **Agility enhancements:** additional benefit from speeding the time to develop and introduce new applications or application function that students, employees and constituents can exploit

HP's IT consolidation value proposition

HP has a rich set of offerings specifically aimed at the higher education marketplace. These include:

- Campus mobility program to improve student and faculty access to computing
- A full range of infrastructure offerings, including UNIX®, Linux, OVMS and NT servers, storage, and networking devices
- A very broad range of access devices, including notebooks, desktops, PDAs and tablet PCs with special terms and conditions and ordering capabilities geared for the higher education marketplace
- A rich set of IT consolidation programs to analyze and recommend consolidation strategies, together with a business case for both IT and the organization as a whole

Case study 1 snapshot: Large midwest university

Original IT environment:

- Mainframe
- Distributed mixed environment (mainly Microsoft® Windows®)
- 250 distributed servers

Challenge and objectives:

Improved security, reduced costs

Project scope:

Consolidation of all departmental data centers and provision of full set of consolidation services

Solution and outcome:

- Moved 90% of IT departmental data centers to centralized data center
 - Introduced a rich set of consolidated infrastructure services
 - Provided \$17.5 million dollars of benefit from the reduced cost of running IT (\$10.7M), and increased organizational value to the users (\$5.8M)
-

- HP Global iCampus Services, with architecture definition, converged networks, network security and application integration
- A clear Adaptive Enterprise strategy for simplifying, virtualizing and automating the key aspects of the data center infrastructure. This consolidated IT environment allows change to be enabled more quickly and resources to be used more efficiently.

Viable consolidation strategies for higher education

Based on interviews with university customers and an analysis of HP's solutions and general knowledge of consolidation, ITCentrix recommends the following specific strategies for universities:

- Ensure the IT department has an appropriate reporting structure to play a centralized role in providing services across the university.
- Establish an infrastructure architecture that builds on the best of what is installed, but over time will provide a more standardized set of hardware, software and integration options (trading slightly reduced component sourcing flexibility and increased cost for piece parts with significantly reduced costs of system management and integration).
- Set in place the following standard consolidated services:
 - Network services
 - Data services (SAN, network-attached storage)
 - Back-up services
 - System management services (including security)
 - Help desk services
 - Database services (Oracle®, SQL, etc.)
 - Enterprise applications such as e-mail
- Migrate departments to a centralized model utilizing these services prioritized by best payback, establishing both a business case and reputation for delivering service as promised.
- Put in place a governance process for establishing the value of the infrastructure and consolidated services to the higher education organization, establishing the value of change, and monitoring the achievement of that change.
- Communicate clearly the reasons for the centralization strategy, and the business case for making the change now.
- Remain patient with a collegiate decision-making process.

Case study 2 snapshot: Medium-sized southern university

Original IT environment:

- Mainframe (moving to open systems)
- Distributed environment (UNIX and Microsoft Windows)
- 100 distributed servers

Challenge and objectives:

Establish confidence in the ability of IT to deliver solutions

Project scope:

Consolidation of selected departmental resources and services

Solution and outcome:

- Created and appointed CIO post reporting to the president
 - Moved 60% of the data centers and servers to a central IT facility, with plans to move 90% within three years
 - Proved the capability of IT to provide services of the same cost and value to the departments
 - Provided \$4.4 million of benefit from the cost of running IT (\$2.9M), and increased value to the users (\$1.5M)
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Figure 1
Overall delta value of IT consolidation in Case 1

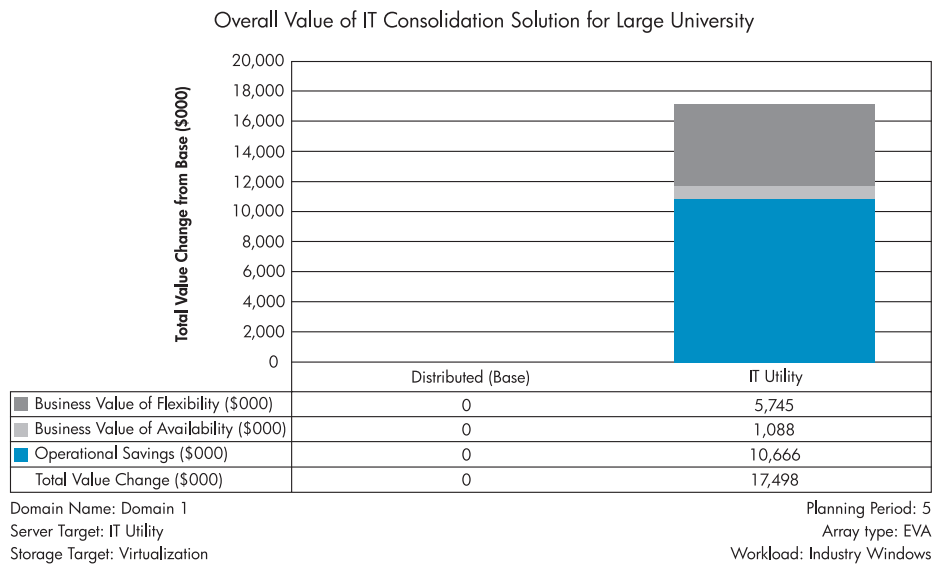
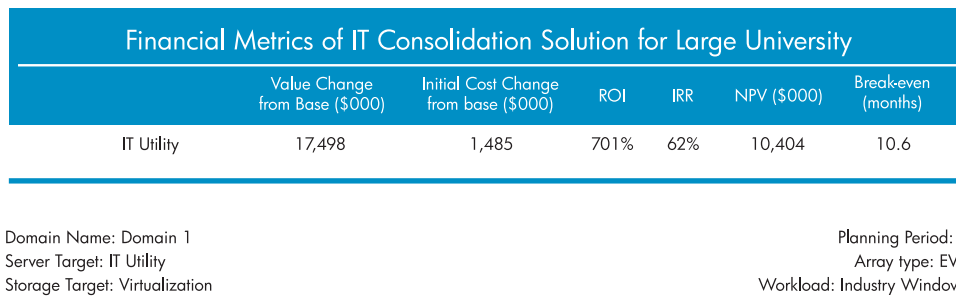


Figure 2
Output from HP ESS IT consolidation assessment service for Case 1



Proof points—University case examples

Case 1 – Large midwest university

Project environment and description

The university had a number of distributed data centers supporting each of the schools with many different networks in place. The quality of infrastructure services was inconsistent and problems with service levels and security among the different data centers were increasing.

The departments believed running their own infrastructure was a burden. Initially, the idea of managing servers was compelling, but after a couple of years the novelty wore off and the task became onerous. The person taking care of a server, for example was typically a student who would graduate and leave with much of the set up,

configuration and mapping information, which lacked commonality across the server infrastructure. It became increasingly difficult to manage those servers for most departments leading to the realization that changes needed to be made.

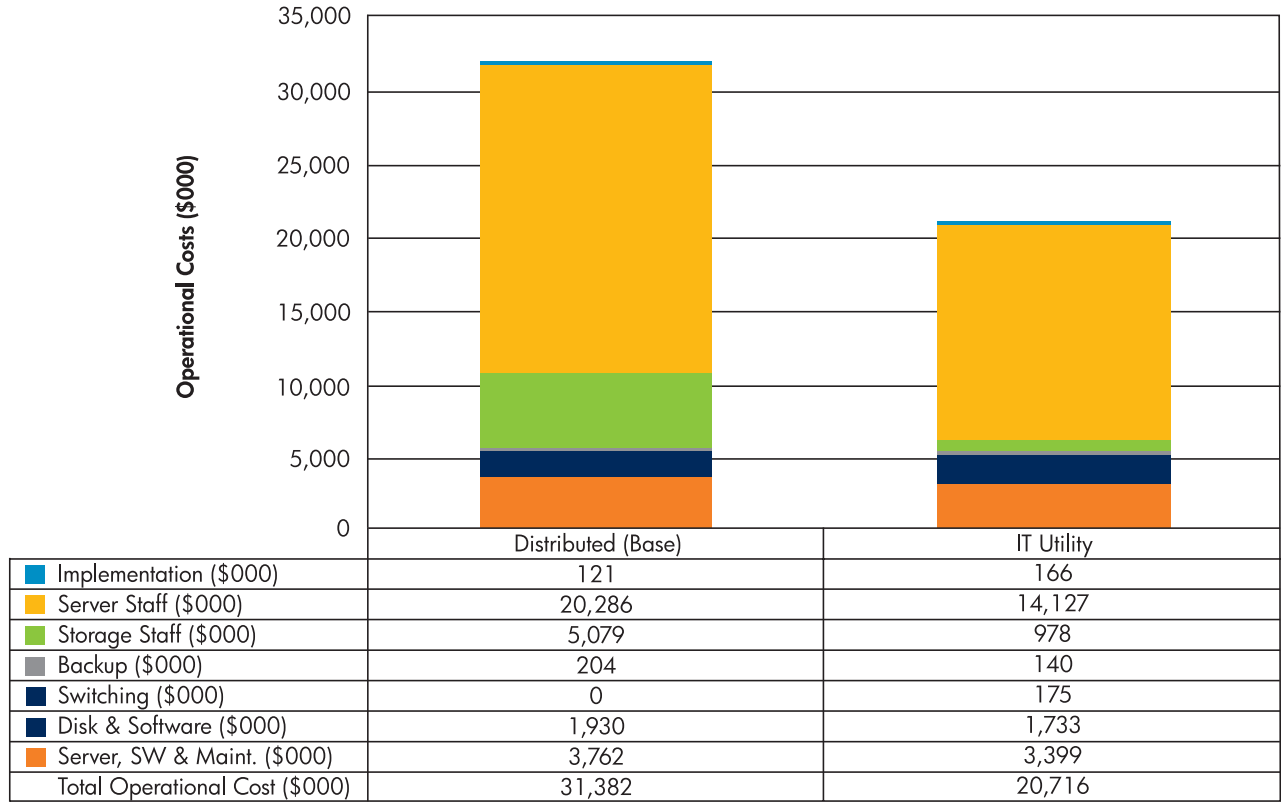
It was also clear that in general, the university lacked a consistent set of data services and backups were at best spotty. Data was being lost on a fairly regular basis. The following provides additional information about the case.

Objectives

- Establish a central IT facility.
- Move a majority of applications and infrastructure from the departments to the IT center.
- Set in place the following standard consolidated services:
 - Common network service
 - Data services (SAN, network-attached storage)
 - Automated back-up services

Figure 3
Total cost of ownership of IT consolidation for Case 1

Total Cost of Ownership of IT Consolidation Solution for Large University



Domain Name: Domain 1
Server Target: IT Utility
Storage Target: Virtualization

Planning Period: 5 Years
Array type: EVA
Workload: Industry Windows

- System management services (including security)
- Help desk services
- Database services (Oracle and SQL)

Achievements

- Achieved all objectives
- Established central IT around academic computing department and expanding from there
- Robust virtualization solutions for data services, backup services and database services
- Provided \$17.5 million dollars of total benefit
- Operational benefit from the cost of running IT was \$10.7M, mainly coming from reducing the cost of management and allowing the reassignment of about 20 people
- Value of increased availability was \$1.1M
- Value of increased agility (ability to implement change more quickly and provide that value to the end-user) was \$5.7M

Future plans

- Move remaining computing from two departments to IT center
- Continuous improvement in quality and cost of service

Model outputs

Figure 1 (pg. 9) – Shows the overall incremental value of centralizing versus the alternative strategy of continuing to distribute computing. The figure compares the replacement cost of the distributed environment with the replacement cost of a centralized solution. It shows the operational savings and the benefits from improved availability and agility.

Figure 2 (pg. 9) – Shows the overall financial data for the business case

Figure 3 (above) – Shows the operational cost differences and the line items for both the current computing model and the more centralized computing model.

Figure 4
Overall delta value of IT consolidation in Case 2

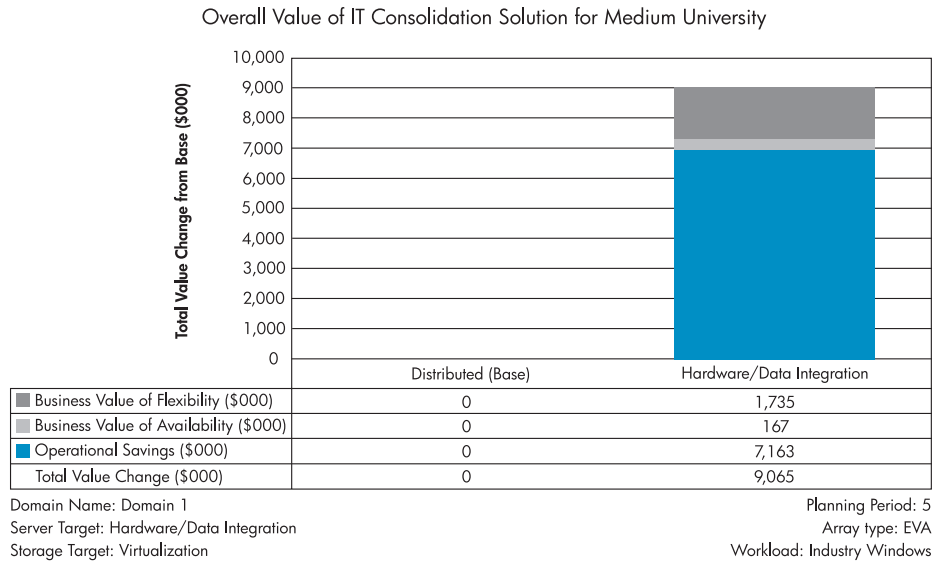


Figure 5
Output from HP ESS IT consolidation assessment service for Case 2

Financial Metrics of IT Consolidation Solution for Medium University – Total Value						
	Value Change from Base (\$000)	Initial Cost Change from base (\$000)	ROI	IRR	NPV (\$000)	Break-even (months)
Hardware/Data Integration	4,357	509	488%	53%	2,485	11.9

Domain Name: Domain 1
Server Target: IT Utility
Storage Target: Virtualization

Planning Period: 5
Array type: EVA
Workload: Industry Windows

Case 2 – Medium-sized southern university
Project environment and description

The university had a very decentralized structure where each of the schools was responsible for its own business and operating plans. It was also a university with older buildings, and setting up modern data center facilities was non-trivial. The university had a distributed data center supporting each of the schools. The heads of each school felt it was important to control the quality and service levels offered.

The head of computing reported to an administrative function, and the president and cabinet thought IT should be streamlined and economies of scale could be achieved by greater consolidation. However, a strong desire to preserve the fundamental decentralized business model trumped the insistence on a completely centralized IT structure. The following additional points are noteworthy.

Objectives

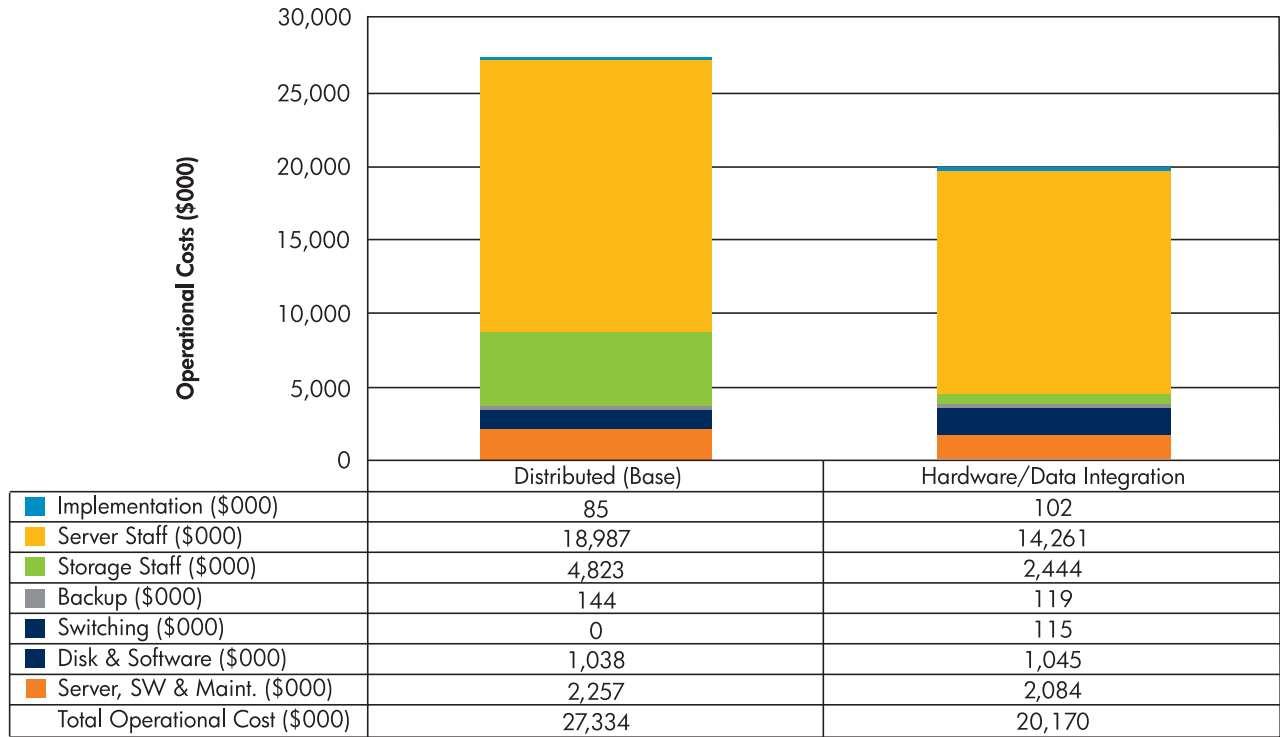
- Get consensus from department heads to move majority of applications and infrastructure from the departments to the IT center.
- Set in place the following standard consolidated services:
 - Common network service
 - Data services (SAN, network-attached storage)
 - Improved security
 - Help desk services

Achievements

- Established the credibility of IT to manage many of the services
- Put in place several shared services
- Moved 60% of services to a centralized IT structure

Figure 6
Total cost of ownership of IT consolidation for Case 2

Total Cost of Ownership of IT Consolidation Solution for Medium University



Domain Name: Domain 1
Server Target: IT Utility
Storage Target: Virtualization

Planning Period: 5 Years
Array type: EVA
Workload: Industry Windows

- Provided \$4.4 million in total benefit
- Operational benefit from the cost of running IT was \$2.9M, mainly coming from reducing the cost of management and allowing the reassignment of about 5 people.
- Value of increased agility (ability to implement change more quickly and provide value to the end-user) was \$1.3M.

Future plans

- Continue to move remaining computing from other departments to IT center to achieve 90% consolidation over the next three years.
- Put in place a common architecture for all schools to leverage economies of scale and improved integration.

Model outputs

Figure 4 (pg. 11) – Shows the overall incremental value of centralizing versus the alternative strategy of continuing to distribute computing. The figure compares the replacement cost of the distributed environment with the replacement cost of a centralized solution. It shows the operational savings and the benefits from improved availability and agility.

Figure 5 (pg. 11) – Shows the overall financial data for the business case

Figure 6 (above) – Shows the operational cost differences and the line items for both the current computing model and the more centralized computing model

Conclusions and recommendations

The two case studies show relevant differences in consolidation strategy and results. In Case 1 the political environment was riper for change. The user department had failed to deliver the management service levels required, and IT management was able to consolidate to a great degree. While this situation had initial detractors, the outcome was positive. As the IT head put it "...even the two areas that were resistant to change are happy. There was an initial 'we don't trust IT because they want to take over everything,' but really once it all happened, they realized it was a good deal for them." As a result, the large mid-western university was able to move aggressively to establish centralized IT processes, provide a broad range of consolidation services, and a greater degree of virtualization of the data center.

In Case 2, the levels of decentralization had ironically produced a high quality of IT in each of the departments. Although the relative business case for centralization was just as strong, the medium-sized southern university only achieved about 50% of the potential benefits. The Case 2 university was unable to provide the same range of consolidation services or virtualization because less consolidation was achieved. In addition, the Case 2 university was initially unable to show an effective business case for the change which slowed the transition. As a result, the main driver was improved security with operational costs and improved flexibility taking a back seat.

The conclusion is for a successful IT consolidation project within higher education, the following six pieces need to be in place:

- 1) An effective organization reporting to the president or equivalent
- 2) A clear message from the most senior people that IT consolidation will take place on an aggressive timescale
- 3) A vision of the set of consolidation services and architecture that should underpin such a migration
- 4) An IT department that has the trust of the faculties, and has a track record of delivering on projects and service
- 5) A strong business case showing the direct and indirect benefits of providing a more centralized approach to managing IT
- 6) A good outside partner for change. As one CIO said "we're so busy trying to build consensus that ... we just don't get anything done." Vendor support with strong experience in higher education is important in establishing a fundamental strategy and architecture that will embrace what is there today and evolve into the future.

A starting point for higher education leaders is getting answers to the following key questions:

- Will my organizational structure support IT consolidation?
- What is the right strategy for IT consolidation? What overall architecture should be in place to support the consolidation? What consolidation services should be offered?
- What support do I need from my IT vendors to decide and implement the right strategy, architecture and services?
- What references and business cases do I require to gain consensus within the higher education constituencies?

To learn more about HP's offering, visit www.hp.com.

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