



The Total Economic Impact™ of Windows File Server Consolidation Using Network Appliance

Project Director:

Bob Cormier, Senior Consulting Advisor

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Forrester Research, Inc.
400 Technology Square
Cambridge, MA 02139
Tel: (617) 613-6000
Fax: (617) 613-5000

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Executive Summary

In September 2003, Forrester commenced work on a research project commissioned by Network Appliance, Inc. that focused on examining the potential return on investment (ROI) enterprises may realize by adopting Network Appliance's File Server Consolidation products.

This report highlights the benefits and costs of deploying Network Appliance's File Server consolidation solutions across the enterprise of a sample organization (see Appendix A: Description of Sample Organization). The findings in this study are in large part based on in-depth interviews conducted with four organizations currently using Network Appliance's products. The report examines the estimated ROI for the sample organization and presents the aggregate findings derived from the interview and analysis process as well as our independent research.

Brief Description of NetApp's Network File Server Consolidation Solutions

Network Appliance storage consolidation for Windows file serving and home directories is a solution comprised of the following major components: NetApp storage systems, data management and data protection software, services and support. The following is a brief description of each component:

- **NetApp storage systems** — based on the NetApp appliance architecture enabling high availability, reliability and business continuance across multiple platforms and storage architectures, i.e., Windows, Unix, or Linux, and NAS or SAN including support for iSCSI
- **NetApp software** — data management and protection software featuring Snapshot™ technology, enabling more frequent and near instantaneous backups, mirroring and rapid restores
- **NetApp services and support** — global service and support intended to reduce data storage risks during and after implementation. NetApp consultants and its network of partners are available to assist in the data migration and consolidation process.

Our interviews and research show Network Appliance's File Server Consolidation products can provide significant value to organizations that perform storage consolidation for their home directory and Windows file server infrastructure. Here is a summary of the common benefits and value statements cited by the interviewed companies:

- A decrease in the number of servers reducing management complexity and saving server licensing and hardware costs
- The ability to scale more easily by adding disks to an existing NetApp Server instead of buying additional servers
- The ability to make storage capacity additions without downtime
- Allows organizations to be more diverse in selecting server platforms (Unix or Windows) now that files can be shared
- The ability to streamline data management processes
- Media and software cost savings associated with centralized backup
- Reduced administrative requirements, managing more data capacity with less people
- Improved virus protection
- Improved reliability

From these common value statements, we were able to extrapolate and generate a potential ROI for a representative organization. The objective is to illustrate how the common benefit and cost estimates can be applied to other organizations contemplating the purchase of Network Appliance’s File Server Consolidation products.

Table 1 below is a three-year summary of the net present value (NPV), risk-adjusted costs and benefits for our sample organization as well as return on investment (ROI) and payback period.

Table 1: Summary Financial Results — Sample Organization

Summary Financial Results	Unadjusted (Best Case)	Risk-Adjusted
Return on investment (ROI)	103%	99%
Payback period	Within 12 months	Within 12 months
Total three-year costs (NPV)	(\$1,076,906)	(\$1,076,906)
Total three-year cost savings (NPV)	\$2,184,362	\$2,146,812
Total three-year net savings (NPV)	\$1,107,456	\$1,069,906

Source: Forrester Research, Inc.

The risk-adjusted breakeven point (payback period) occurred 12 months after the initial deployment. ROI was a very favorable 99 percent on a risk-adjusted basis. If a risk-adjusted ROI still demonstrates a compelling business case, it raises confidence that the investment is likely to succeed since the risks that threaten the project have been taken into consideration and quantified.

An intangible benefit not included in the financial data above relates to potential improvements in end-user productivity due to faster restores of data and files. Later in this study we will discuss in detail this potential benefit as well as *all* the costs, benefits, risks and flexibility options that were experienced by the interviewed organizations using these products.

Customer Interview Highlights

As mentioned in previous sections, our conclusions are derived in large part from information received in a series of in-depth interviews with executives and personnel at four organizations currently using Network Appliance’s File Server consolidation solutions. Here is a brief description of each of the interviewed organizations:

- A worldwide leader in networking products for the Internet providing a broad solution set for transporting data, voice and video: It has more than 30,000 employees that operate in more than 100 countries.
- A Fortune 100 company and one of the world’s largest providers of communications services including wireline, wireless and long-distance communications
- A multi-billion dollar, global oilfield and information services company focusing on the energy industry with offices and operations in more than 100 countries
- A Fortune 1000 leading provider of professional services, information and solutions to the pharmaceutical, biotechnology and health-care industries with 15,000 employees operating in more than 35 countries

Common Challenges of Interviewed Organizations

The customers we interviewed had several common file server challenges attributed to the expansion of Windows servers, which contributed to an unmanageable file serving environment. As the need for additional storage grew, each organization bought additional servers and found that this growing infrastructure was not easy to manage. The interviewed customers shared some of the following common issues and challenges:

- Their file server infrastructure was not scalable
 - Growth was managed by adding more servers
 - Adding storage to their existing environment creates a more complex, less manageable environment
 - It was challenging for Unix and Windows users to securely share data
 - An underutilization of server and storage environments
- Backups were time consuming
 - Increasing the number of servers adds to the already time-consuming and labor-intensive backup process
 - Tape backups (and management and storage) are required for each additional server
 - For most organizations, their backup windows are shrinking with the demand for 24x7 availability and the growing amount of data to be backed up
 - Requires management at remote offices
- Security management and susceptibility concerns
 - Need to manage security and operating system patches and updates for each server
 - More servers that need virus protection and updates
- Data recovery took too long
 - Tapes were frequently at offsite locations and needed to be identified
 - End-user productivity impacted by inability to retrieve data in a timely manner
 - Possibility of tape failure, or backup not being done successfully

Total Economic Impact™ (TEI) Analysis Methodology

Network Appliance selected Forrester for this project because of Forrester's Total Economic Impact™ (TEI) analysis methodology, which not only measures costs and cost reduction (areas that are typically accounted for within IT) but also weighs the enabling value of a technology in increasing the effectiveness of overall business processes. We employed four fundamental elements of TEI (see Appendix B: Total Economic Impact™ Primer) in modeling the ROI for file server consolidation products:

1. Cost and cost reduction
2. Benefits to the entire organization
3. Flexibility
4. Risk

Given the increasing sophistication that enterprises have regarding cost analyses related to IT investments, the TEI methodology serves an extremely useful purpose by providing a complete picture of the total economic impact of purchase decisions.

Sample Organization

We examined the costs and benefits of Network Appliance's File Server Consolidation solutions by conducting in-depth interviews with four Network Appliance customers currently using these products. The resulting data, along with our independent research, generated a baseline to determine the potential ROI for organizations contemplating their own deployment of these products. Our sample organization below has similar costs, benefits, goals and objectives as the four companies that were interviewed. The purpose of our sample organization is to show the potential ROI.

Description of Sample Organization

In this study, we have created a sample organization to illustrate the quantifiable costs and benefits of deploying Network Appliance's File Server Consolidation products. (For further details see Appendix A: Description of Sample Organization).

Organization Profile:

- A Fortune 1000-size enterprise
- Its manufacturing, engineering and corporate offices are located in three major locations worldwide; US Midwest, Europe and US East Coast
- Sales and services offices are located in 20 locations in North America. It also has sales and services offices in Europe, Asia and the Far East
- It has 80 Windows file servers (that it wants to consolidate) spread across the three major sites, supporting 8.8TB of home directory and shared departmental storage
- Storage capacity requirements are growing by 30 percent per year

The Decision and Goal:

As a result of the increasing costs required to maintain its IT infrastructure and the reduction of budget allocations, our sample organization has decided to perform server/storage consolidation for its users' home directory and Windows file server infrastructure with a goal to both reduce costs and the time spent to manage the Windows file server infrastructure.

Critical Success Factors and High-Level Business Objectives

Here are the high-level business objectives or strategies that the sample organization is hoping to achieve by implementing file server consolidation:

- To sustain the organization's growth rates while reducing the overall cost of file server storage management
- To better manage its growing file storage environment
- Scale storage while minimizing additional administration and user downtime
- To more efficiently manage all its file servers including security patches, OS upgrades and data management
- Increase disk utilization rates on file servers
- Improve file server infrastructure reliability
- Reduce the time spent managing infrastructure

Proposed Network Appliance Solution

The following Network Appliance storage solution is proposed to consolidate the Windows file serving requirements in its three major locations:

US Midwest location: A Network Appliance FAS940C enterprise server will handle the 15,000 corporate and 8,000 engineering and manufacturing user home directories and shared departmental data.

European location: A Network Appliance FAS825C enterprise server will store and serve user home directories as well as the sales and manufacturing shared data.

US East Coast location: A Network Appliance FAS825C enterprise server will provide for user home directories and the requisite shared departmental data.

The sample organization has also chosen to deploy a Windows Active Directory infrastructure where it has located two domain controllers in each site (US Midwest, European and US East Coast locations). The Network Appliance storage device deployment will make use of the site deployments and use the domain controllers in the local site for authentication. Our sample organization will also be deploying MultiStore in the US East Coast and European locations since this provides the least disruptions to the user population. In all locations, our organization will be making use of Virtual File Manager (VFM) and setting up an integrated namespace to cover its entire US operations. In the US Midwest location, our sample organization has already been making use of Distributed File System (DFS) and will manage the namespace with VFM.

Here is a brief summary of the hardware, software and services included for the three locations:

US Midwest HQ and Manufacturing and Engineering Location

FAS940C Enterprise Server — with an initial 6.9TB of usable capacity (upgraded in subsequent years) with cabinet and disk shelves, Data ONTAP, VFM, SnapRestore, installation, DFM, 36-month warranty with four-hour response time

European Location

FAS825C Enterprise Server — with an initial 1.4TB of usable capacity (upgraded in subsequent years) with cabinet and disk shelves, Data ONTAP, VFM, MultiStore, SnapRestore, installation, DFM, 36-month warranty with four-hour response time

US East Coast Location

FAS825C Enterprise Server — with an initial 2.0TB of usable capacity (upgraded in subsequent years) with cabinet and disk shelves, Data ONTAP, VFM, MultiStore, SnapRestore, installation, DFM, 36-month warranty with four-hour response time

Here is a brief description of the software included in the proposal:

- **Data ONTAP** — a Network Appliance operating system that enables serving mixed SAN and NAS workloads, and reducing storage management complexity: Data ONTAP software integrates into Unix, Windows and Web environments.
- **Snapshot** — provides near instantaneous backup of data using minimal disk space without degrading system performance
- **SnapRestore** — allows a system to revert back to a specified data volume: Terabytes can be recovered in minutes, rather than hours, without going to tape. The software also facilitates scenario testing as well as providing disaster recovery and virus protection.
- **Virtual File Manager (VFM)** — a file virtualization solution for managing distributed storage in Windows environments.
- **DataFabric Manager (DFM)** — offers the ability to manage multiple NetApp storage appliances, NearStore systems and NetCache appliances from a single administrative console.
- **MultiStore** — provides secure partitioning of network and storage resources enabling multi-domain and multi-server consolidation on a single storage appliance

Costs, Benefits, Flexibility and Risk

Costs

Cost and cost reduction are an important part of the TEI model. Costs, or IT impact, are calculated as a change in costs primarily to IT as a result of the introduction of the technology to the organization. Therefore, the introduction of the File Server Consolidation solution affects IT budgets negatively with the purchase of the solution, as well as positively, in terms of the potential cost savings and efficiencies created.

The impact of cost is accrued in two different areas: Network Appliance solution costs and the sample organization's internal preparation and planning costs.

Costs for the Network Appliance Solution

For the US Midwest HQ and manufacturing and engineering location (Network Appliance three-year costs = **\$538,651**): Initial minimum capacity requirements are 6.3TB of storage growing to 8.1TB in year two, and 10.65TB in year three. The capacity growth is more than 30 percent because we used increments of fully populated disk shelves to simplify the pricing:

- **Initial implementation, FAS940C Enterprise Server** — 6.9TB of usable capacity with cabinet and disk shelves, Data ONTAP, VFM, SnapRestore, installation, DFM, 36-month warranty with four-hour response time. The hardware, software, installation and 36-month warranty will cost our sample organization **\$434,665** for this location.
- **Year two upgrade, FAS940C Enterprise Server upgrade** (to accommodate 30 percent growth) — 9.6TB of usable capacity including disk drives, HBAs, four disk shelves, an additional cabinet and support and maintenance costs. The cost of this upgrade in year two is **\$71,197**.
- **Year three upgrade, FAS940C Enterprise Server upgrade** (to accommodate 30 percent growth) — 11.0TB of usable capacity including disk drives, HBAs, disk shelves and additional support and maintenance costs. The cost of this upgrade in year three is **\$32,789**.

For the European location (Network Appliance three-year costs = **\$252,552**): Initial minimum capacity requirements are 1.0TB of storage growing to 1.3TB in year two, and 1.69TB in year three. The capacity growth is more than 30 percent because we used increments of fully populated disk shelves to simplify the pricing:

- **Initial implementation, FAS825C** — 1.4TB of usable capacity with cabinet and disk shelves, Data ONTAP, VFM, MultiStore, SnapRestore, installation, DFM, 36-month warranty with four-hour response time. The initial hardware, software, installation and 36-month warranty will cost our sample organization **\$230,277** for this location.
- **Year two upgrade, FAS825C upgrade** (to accommodate 30 percent growth) — 1.7TB of usable capacity including disk drives, HBAs, two disk shelves and support and maintenance costs. The cost of this upgrade in year two is **\$16,115**.
- **Year three upgrade, FAS825C upgrade** (to accommodate 30 percent growth) — 2.0TB of usable capacity including additional disk drives, support and maintenance costs. The cost of this upgrade in year three is **\$6,160**.

For the US East Coast location (Network Appliance three-year costs = **\$275,272**): Initial minimum capacity requirements are 1.5TB of storage growing to 1.95TB in year two, and 2.54TB in year three. The capacity growth is more than 30 percent because we used increments of fully populated disk shelves to simplify the pricing.

- **Initial implementation, FAS825C** — 2.0TB of usable capacity with cabinet and disk shelves, Data ONTAP, VFM, MultiStore, SnapRestore, installation, DFM, 36-month warranty with four-hour response time. The initial hardware, software, installation and 36-month warranty will cost our sample organization **\$252,997** for this location.
- **Year two upgrade, FAS825C upgrade** (to accommodate 30 percent growth) — 2.4TB of usable capacity including disk drives, HBAs, two disk shelves, support and maintenance costs. The cost of this upgrade in year two is **\$16,115**.
- **Year three upgrade, FAS825C upgrade** (to accommodate 30 percent growth) — 2.7TB of usable capacity including additional disk drives, support and maintenance costs. The cost of this upgrade in year three is **\$6,160**.

The total Network Appliance costs for all three locations are **\$1,066,475** for hardware, software, support and maintenance for three years.

The financial results in this study assume our sample company purchased and deployed Network Appliance's File Server Consolidation products at a normal discount off NetApp's US list price as of October 2003. Other organizations may incur different prices; therefore, we make no assumptions that other organizations will achieve similar results as those cited in this report.

Internal Preparation and Planning Labor = \$39,600

A readiness assessment that looks at costs, benefits and risks, along with detailed planning, are essential for a successful file server consolidation initiative. Based on interviews with current NetApp customers, our sample organization required two FTEs (full-time equivalents) to spend 2.5 months of their time (before and during implementation) planning and testing methods of moving data from one device to another, including moving hundreds of file shares to a filer and adjusting backup routines.

Benefits and Savings

In addition to the costs associated with the hardware, software and planning costs, there were positive IT cost savings and benefits with the new consolidated server environment. Based on an analysis of the interviews with the participating customers, there were several benefits cited as a result of implementing Network Appliance File Server Consolidation solutions, as follows:

- A decrease in the number of servers reducing management complexity and saving server licensing and hardware costs
- The ability to scale more easily by adding disks to an existing NetApp Server instead of buying additional servers
- The ability to make storage capacity additions without downtime
- Allows organizations to be more diverse in selecting server platforms (Unix or Windows) now that files can be shared
- The ability to streamline data management processes
- Media and software cost savings associated with centralized backup
- Reduced administrative requirements, managing more data capacity with less people
- Improved virus protection
- Improved reliability

Based on our interviews, we were able to quantify several of the benefits based on the actual experience of Network Appliance's customers:

A Decrease in Number of Servers, and Repurposing Servers

Our sample organization today has 80 file servers in three locations, and its storage capacity is growing by 30 percent annually. One option is to continue to purchase Windows file servers to accommodate the 30 percent growth at a three-year cost of **\$1,215,750** (see Scenario #1 below for details). The other option is to purchase Network Appliance file server consolidation solutions at a "net" cost of **\$858,475** (see Scenario #2 below for details). The Network Appliance solution offers the additional benefit of repurposing about half of the 80 existing file servers elsewhere in the sample organization for a net savings of **\$357,275**.

1. **Scenario #1 (the status quo):** The sample organization continues to accommodate 30 percent growth by purchasing additional Windows file servers, and continues to replenish existing end-of-life Windows file servers. The incremental costs associated with this option are **\$1,215,750**, including:
 - It will purchase 24 new file servers in year two at a cost of **\$190,800** for hardware plus **\$36,000** annually (years two and three of our analysis) for Windows Server license software and infrastructure, support and maintenance costs.
 - It will purchase 31 new file servers in year three at a cost of **\$246,450** for hardware plus **\$46,500** in year three of our three-year analysis for Windows Server license software and infrastructure, support and maintenance costs.
 - It will add file server administrative support staff equal to 1.1 FTEs in year two at a cost of **\$104,500** and 2.5 FTEs in year three at a cost of **\$237,500**. This coincides with Forrester's independent research, which estimates a server per FTE staff ratio of 22:1 for low to moderately complex Windows file servers.
 - It will continue to replenish existing file servers at a replacement rate of 25 percent per year. In year two, 20 of the existing 80 servers will be replaced at a hardware cost of **\$159,000**. In year three, 20 more existing servers will be replaced at a hardware cost of **\$159,000**. All other software, support and maintenance costs remain the same for replenished hardware.
2. **Scenario #2 (purchase Network Appliance solutions):** The sample organization purchases Network Appliance File Server Consolidation solutions at the beginning of year one and upgrades these solutions in years two and three to accommodate 30 percent growth. The total Network Appliance costs for all three locations is **\$1,066,475** for hardware, software, support and maintenance costs for three years (for details see section above titled: Costs for the Network Appliance Solution).

This scenario also includes a conservative estimate of savings of **\$208,000** from repurposing half of the 80 Windows servers replaced by Network Appliance hardware as outlined below:

The FAS940C server and the two FAS825C servers will replace the existing 80 Windows file servers during year one, leaving the replaced servers as candidates for repurposing within our sample organization as follows:

- 20 servers are four years old and are scheduled to be replaced in the current year and will be discarded.
- 20 servers are three years old and are scheduled to be replaced next year; these will be discarded also.
- 20 servers are two years old and will be reconfigured at a cost of \$750 each, to be repurposed in the sample organization's normal replenishment cycle.
- 20 servers are approximately one year old and will be reconfigured at a cost of \$750 each, to be repurposed in the sample organization's normal replenishment cycle.

As a result of repurposing 40 servers, the sample organization will avoid the costs of new servers elsewhere in the organization. Discounting for the shorter useful life of these repurposed servers, we estimate that the savings (cost avoidance) will be \$5,200 per server (net of \$750 reconfiguration costs) or **\$208,000** in year two.

The net costs associated with this scenario (#2) are **\$858,475** (NetApp solution costs of **\$1,066,475** less repurposing benefits of **\$208,000**).

Therefore, the server-related cost savings of purchasing Network Appliance solutions vs. continuing to add additional Windows servers (#1) is **\$357,275**.

This of course does not include the other benefits of having a consolidated Windows files server environment — see below for additional savings.

A Reduction in the Number of Existing Servers

Upon implementation of NetApp File Server Consolidation solutions, each interviewed organization reduced the number of Windows file servers and experienced savings associated with file server hardware, licensing and management complexity. For our sample organization, we estimate that the licensing, infrastructure, maintenance and support costs savings associated with a reduction in *existing* servers would be \$1,500 per server, per year or **\$120,000** annually (50 percent phased in for year one) based on a reduction of 80 file servers over the course of the first year of implementation.

Ability to Forgo Replenishment of Existing Servers

In the preceding cost section, we included the hardware, software and maintenance expenses associated with the new Network Appliance FAS940C and FAS825C Enterprise Servers and subsequent upgrades during a three-year period. We also recognized the software licensing, support and maintenance savings from a reduction in the number of existing servers.

We now need to recognize the cost avoidance of not having to replace the original 80 servers with replenishment servers. Assuming a four-year life cycle, the sample organization would have had to replace 20 servers per year at a cost of \$7,950 each (hardware only). This results in hardware cost avoidance of **\$159,000** annually in years one through three.

Simplification of Backup and Recovery Tasks

Several organizations highlighted savings in the time it takes to restore data to the current environment. Prior to deploying file server consolidation solutions, several organizations found that the time to restore from backup tapes was significant, both in terms of inefficient use of IT resources and end-user downtime. We estimate the savings resulting from improving the labor efficiencies of backup and restore for the sample organization will be **\$95,000** in years two and three of our three-year analysis. Because of first-year ramp-up and the learning curve required to take full advantage of the new solution, the first-year savings will be 65 percent of yearly savings, or **\$62,000** in year one. These are based upon a fully burdened salary of \$95,000.

Media and Software Cost Savings Associated With Centralized Backup

Once the Windows files servers are consolidated onto Network Appliance devices, there will be cost savings associated with performing centralized backups, including equipment, software and media costs. Instead of having a backup solution for each of the original 80 file servers, you now have only three devices from which to perform data backups. Three of the four interviewed companies reported these savings. The sample organization was able to save **\$45,000** annually in media (tape), backup equipment and software costs.

Reduction in File Server Administration Staffing Costs

The interviewed organizations reported various reductions in the staff costs for file server administrative support. Our independent research estimates a server per FTE staff ratio of 22:1 for low to moderately complex Windows file servers saving approximately \$95,000 annually for every 22 servers eliminated or avoided. For our sample organization, we included a reduction of these costs as follows:

- **Year one** — reduction of 80 servers during year one, thereby saving an average of 3.6 FTEs during the first year or **\$171,000** savings (which represents a 50 percent phase in of the savings for year one).
- **Year two** — avoidance of 24 more servers (to accommodate 30 percent growth) for a reduction of 104 servers, saving 4.7 FTEs for a cost savings of **\$446,500** in year two.
- **Year three** — avoidance of 31 more servers (to accommodate 30 percent growth) for a reduction of 135 servers, saving 6.1 FTEs for a cost savings of **\$579,500** in year three.

The total three-year cost savings associated with a reduction in file server administration staffing costs is **\$1,197,000**.

Benefit to the Business

While the selection of a file server consolidation solution is primarily made within IT, it is important to understand the potential accrued benefits to the entire organization. In particular, the decision to move forward with a consolidated file server environment can potentially have a positive impact on the ability of the overall organization to maintain a higher level of availability of data throughout the life cycle of the investment. In addition, the ability to restore data quickly in the event of a failure can lessen the disruptive impact to the organization. The results of the interviews indicated that an important, albeit intangible, part of the justification for this technology included the ability to maintain critical business processes by having the enhanced ability to restore data very quickly to end users.

Reduction in End-User Downtime (intangible benefit not included in our return on investment calculations)

Several organizations cited the *potential* cost of end-user downtime as a result of having to restore files at the request of end users. This represents potential downtime to the end user while waiting to get the file restored from a tape backup in the pre-consolidation environment. It is estimated that the time lost as a result from accidental deletes is approximately 0.2 lost hours of productivity per month, or 2.4 hours per employee per year. Based on an average base salary of \$47,000 annually (\$22.60 per hour), this translates into approximately **\$813,600** in *potential* savings annually based on a 15,000 end-user base involved in critical business processes. These savings, although potentially significant, are not included in our sample organization's ROI calculations since we cannot confirm that impacted employees will be totally unproductive without access to the lost files.

Flexibility

Flexibility, as defined by TEI, represents investing in additional capacity or agility that can for some *future* additional investment be turned into business benefit. We believe organizations that invest in storage management tools create the additional capacity and agility to allow for more beneficial deployments of future applications. This flexibility does not promise benefit during the initial implementation phase of the project and must be captured later. The existence of the option to capture these savings has a present value that can be estimated. The flexibility component of TEI captures that value using the financial industry standard Black-Scholes options valuation formula.

Three of the four organizations we interviewed indicated they had plans to add new productivity and/or revenue applications to their computing environments. All four organizations indicated that with Network Appliance's file server consolidation solutions, their computing environments were more flexible and agile, allowing them to quickly deploy future new software applications. We believe there is quantifiable value in having the flexibility and agility to deploy new software *faster*, thereby gaining the benefits of the application earlier. Our sample organization's initial investment in FAS940C and FAS825C Enterprise Servers means the heads and rack infrastructure already exist, which accelerates the future addition of disk storage components.

Furthermore, this readily available file server storage capacity will give them the "option" to *accelerate* the implementation of the business application, which will take advantage of productivity and/or revenue benefits earlier. In our sample company, we value these flexibility options at a risk-adjusted **\$95,381**.

Prior to our sample organization investing in Network Appliance File Server Consolidation products, it would have purchased an additional server and storage to support the new application. This purchase process would have delayed the business application's implementation by the four- to eight-week procurement process, which includes vendor quotes, internal review and approval, vendor selection and purchase, delivery and installing a new server. Having the future ability to accelerate benefits has a present day value that TEI includes in our ROI analysis.

The value of flexibility is clearly unique to each organization, and the willingness to measure its value varies from company to company. For the purpose of this analysis, we have assumed that the sample organization sees the value of flexibility in being able to accelerate the implementation of the application, taking earlier advantage of the productivity and/or revenue benefits. The value of the option (\$95,381) is calculated based on the Black-Scholes Option Pricing formula. (For additional information regarding the flexibility calculation, please see Appendix B.)

Risk

Risk-adjusted and non-risk-adjusted ROI are both discussed in this study. The sample organization's costs, benefits and flexibility are quoted in non-risk adjusted (best case) terms and before risk adjustments are made. The assessment of risk provides a range of possible outcomes based on the risks associated with IT projects in general and specific risks relative to file server consolidation projects. In our research, we discovered that implementing file server consolidation solutions was a relatively low-risk endeavor if organizations took the time to thoroughly plan the transition process.

Risk factors are used in TEI to widen the possible outcomes of the costs and benefits (and resulting savings) associated with a project. Since the future cannot be accurately predicted, there is risk inherent in any project. TEI captures risk in the form of risks-to-benefits and risks-to-costs.

Measurement of risk is a way of incorporating the levels of confidence and uncertainty regarding the cost and benefit estimates of a given investment. Higher confidence that the costs and benefit estimates will be met implies that the level of risk is lower, and the variation between the risk-adjusted and non-risk-adjusted outcomes is minimized.

The following *general* risks were considered in this report:

- Lack of corporate discipline in creating processes and procedures to best take advantage of the benefits
- Lack of appropriate training for IT personnel who will be responsible for optimizing the full benefit potential from consolidating file servers
- Failure to reduce, transfer or redeploy IT support headcount made redundant by deploying file server consolidation solutions
- The potential that the benefits will not be measured and quantified in the future, and as a result no TEI benefit would be captured and acknowledged
- Internal inertia, conflicting priorities and turnover, reducing the organization's ability to achieve the benefits

The following risks associated with File Server Consolidation solutions were considered in this report:

- Once consolidated, each potential point of failure in the server farm will put significantly more data at risk.

- The inability of an organization to find, train and retain administrators fluent in Network Appliance’s Data ONTAP operating system as well as VFM, SnapRestore and DFM software, to take full advantage of the benefits outlined in this study.

If a risk-adjusted ROI still demonstrates a compelling business case, it raises confidence that the investment is likely to succeed, since the risks that threaten the project have been taken into consideration and quantified. The risk-adjusted numbers should be taken as “realistic” expectations, since they represent the expected value considering risk. Assuming normal success at mitigating risk, the risk-adjusted numbers should more closely reflect the expected outcome of the investment.

Project Summary

The following table (repeated from the Executive Summary) illustrates the potential ROI for the sample organization based on data obtained from interviews with four organizations from four different industries. The objective here is not to illustrate a common ROI that companies can obtain if deploying Network Appliance file server consolidation solutions, but rather to show the process of identifying common cost and benefit estimates and applying them to similar organizations. The results should be used as a guide that would allow organizations to determine the appropriate ROI of the solution for their particular environment.

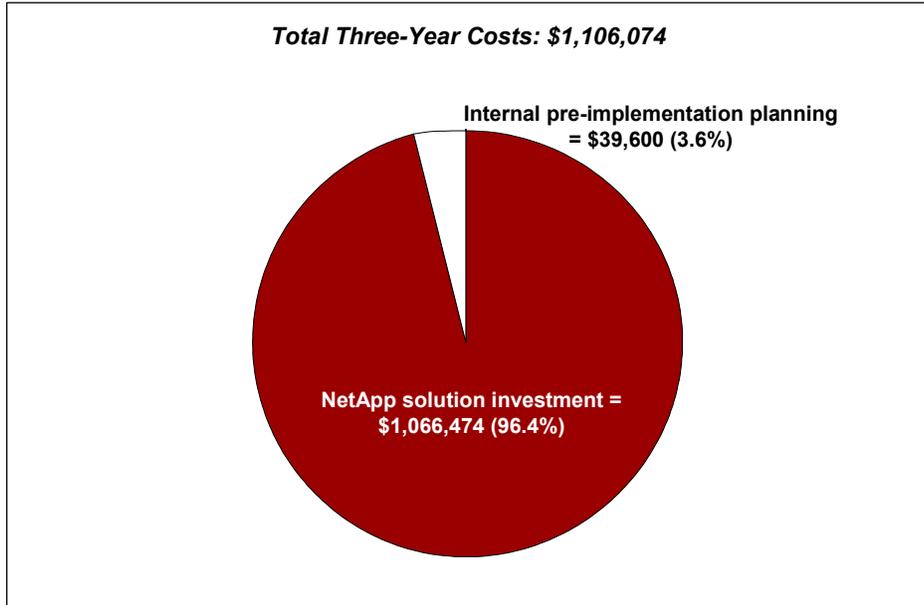
Table 1: Summary Financial Results — Sample Organization

Summary Financial Results	Unadjusted (Best Case)	Risk-Adjusted
Return on investment (ROI)	103%	99%
Payback period	Within 12 months	Within 12 months
Total three-year costs (NPV)	(\$1,076,906)	(\$1,076,906)
Total three-year cost savings (NPV)	\$2,184,362	\$2,146,812
Total three-year net savings (NPV)	\$1,107,456	\$1,069,906

Source: Forrester Research

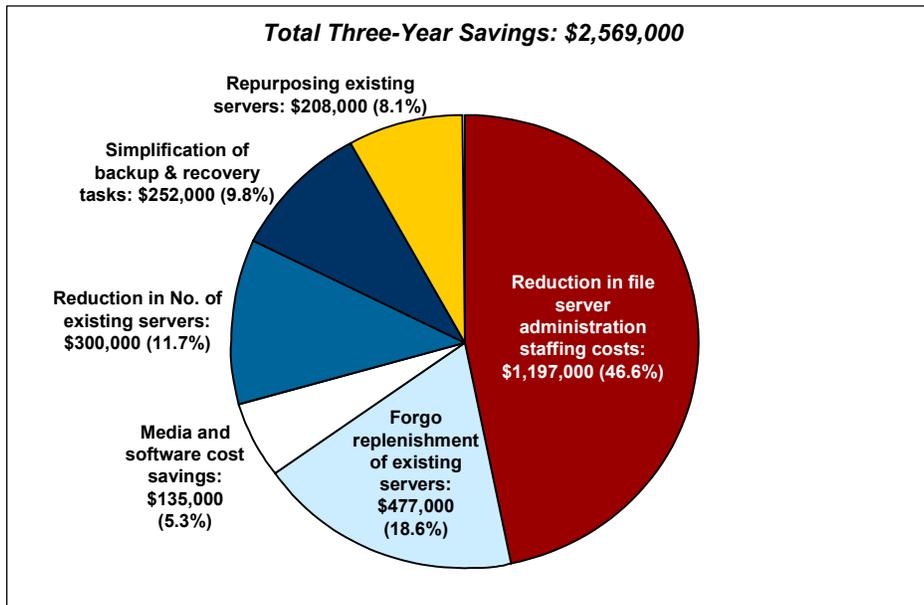
Figure 1 illustrates the breakdown of costs and benefits during a three-year period. Network Appliance product (hardware, software, services) costs make up 96 percent of the total three-year life-cycle costs.

Figure 1: Sample Organization — Costs (Non Risk-Adjusted)



Source: Forrester Research, Inc.

Figure 2: Sample Organization — Benefits and Cost Savings (Non Risk-Adjusted)



Source: Forrester Research, Inc.

Findings

As the data in this study indicates, NetApp's File Server Consolidation solutions have the potential to provide an excellent return on investment. In addition, the risk-adjusted ROI of 99 percent, along with a 12-month payback period (breakeven point), raises confidence that the investment is likely to succeed since the risks that may threaten the project have already been taken into consideration and quantified. In this report, risks have been modeled conservatively in the hopes of showing worst-case expectations.

A successful, well-planned implementation will allow cost savings to accrue to both IT and potentially the entire organization. In addition, the study found a value associated with the amount of flexibility that is inherent in NetApp's File Server Consolidation solutions. In particular, it can be leveraged in adding new productivity and revenue-generating applications in the future.

Organizations that are likely to achieve this ROI have the following characteristics:

- Medium to large-sized organizations with multiple Windows file servers (home directories and public shares) with growing capacity and that are proving difficult to manage and maintain
- Organizations that are looking to use the same underlying storage platform for NAS and Fibre Channel SAN and iSCSI
- Organizations that are upgrading their Windows operating system and want to consolidate servers at the same time

For most organizations, NetApp's File Server Consolidation solutions carry a low level of risk, a significantly positive ROI and a reasonable one-year horizon to recoup the investment.

We make no assumptions regarding the effects of Network Appliance's File Server Consolidation solutions at other companies. This report examines the potential impact attributable to the four organizations that participated in our examination and applies the common costs and benefits to a representative sample company. The underlying objective of this document is to provide guidance to technology decision-makers seeking to identify areas where value can potentially be created based on use of the File Server Consolidation solution.

Appendix A: Description of Sample Organization

In this study, we have created a sample organization to illustrate the quantifiable costs and benefits of deploying Network Appliance's File Server Consolidation products. Our sample organization is a Fortune 1000-size enterprise. Its manufacturing, engineering and corporate offices are located in three major locations worldwide (Europe, US East Coast and US Midwest). Sales and services offices are located in 20 locations in North America. It also has sales and services offices in Europe, Asia and the Far East.

As a result of the increasing costs required to maintain its IT infrastructure and the reduction of budget allocations, our sample organization has decided to perform server/storage consolidation for its home directory and Windows file server infrastructure in an effort to reduce costs.

Current Environment

- 80 Windows file servers
 - Maximum of 1,000 users per file server
 - Maximum of 100GB per file server
 - Allow 200MB maximum (100MB average) storage per user
 - Windows file servers use direct attached storage (DAS) and not networked storage
 - Window file servers are used for home directories, departmental shares and corporate shares
- Storage
 - Each major office location has 500GB location specific data and also keeps copies of other major office location data
 - 500GB shared major office data
 - 50GB per department shared data (departments include human resources, finance, administration, shipping, legal, IT, marketing and sales)
 - The sample organization's file server storage capacity needs are growing by 30 percent annually for the three years of this financial analysis
 -
- Number of Users
 - US East Coast major office location has 5,000 users
 - European major office location has 2,000 users
 - US Midwest manufacturing and engineering location has 8,000 users and shares a campus with the corporate administration offices, which have an additional 15,000 users
- Backups
 - Weekly full backups and daily incrementals are done at each site with the tapes sent offsite. It is currently coordinating backups for all of these servers individually

Here are the high-level business objectives or strategies that the sample organization is hoping to achieve by implementing file server consolidation:

- To sustain the organization's growth rates while reducing the overall cost of file server storage management
- To better manage its growing file storage environment
- To more efficiently manage all its file servers including security patches, OS upgrades and data management

- Increase disk utilization rates on file servers
- Improve file server infrastructure reliability
- Reduce the time spent managing infrastructure

Here are the specific requirements and expectations our sample organization has for file server consolidation products:

- **Performance:** any changes must provide the same level of performance or preferably a better level of performance
- **Scalability:** the changes must provide an easier level of scalability. Currently expanding a RAID system requires a significant amount of downtime. The changes must provide for reduced downtime when scaling to larger systems.
- **Availability:** changes to the existing infrastructure should provide for both reduced backup and restore windows. Additionally, replacing the existing file serving infrastructure should result in increased uptime. Currently the existing file servers are providing only 95.5 percent uptime.
- **Centralized backup:** the ability to perform a centralized backup is highly desired. Currently backups are performed individually at each site.
- **Minimal desktop touches:** Changes to the environment should make the smallest impact on the current running environment. In particular the ability to deploy a solution that requires no or minimal changes to the existing desktops is desired.
- **Decrease ongoing costs:**
 - Increased manageability: the ability to centrally manage the new infrastructure components at a lower labor effort
 - Reduce need for skilled staff
 - Reduce the costs of the backup tape environment
 - Reduce the need for floor space and associated environmental costs
- **Data recovery:** It must simplify the data recovery process to offload work from IT
- **Minimize downtime:** It must minimize the impact of any infrastructure change on the client users, minimizing downtime during transition

Proposed Solution

The proposed solution is to consolidate the file serving requirements in their three major locations.

In the European location, an F825C will serve user home directories as well as the sales and manufacturing shared data. Similarly, in the US East Coast location, an F825C will provide for user home directories and the requisite shared departmental data. In the US Midwest campus, an F940C services the 15,000 user home directories and provides shared departmental data. The sample organization has also chosen to deploy a Windows Active Directory infrastructure where it has located two domain controllers in each site (Europe, US East Coast and US Midwest).. The proposed Network Appliance storage device deployment will make use of the site deployments and use the domain controllers in the local site for authentication. Our sample organization will also be deploying MultiStore in the US East Coast and European locations since this provides the least disruption to the user population. In all locations, our sample organization will be making use of Virtual File Manager (VFM) and setting up an integrated namespace to cover its entire US operations. In the US Midwest location, our sample organization has already been making use of Distributed File System (DFS) and will manage the namespace with VFM.

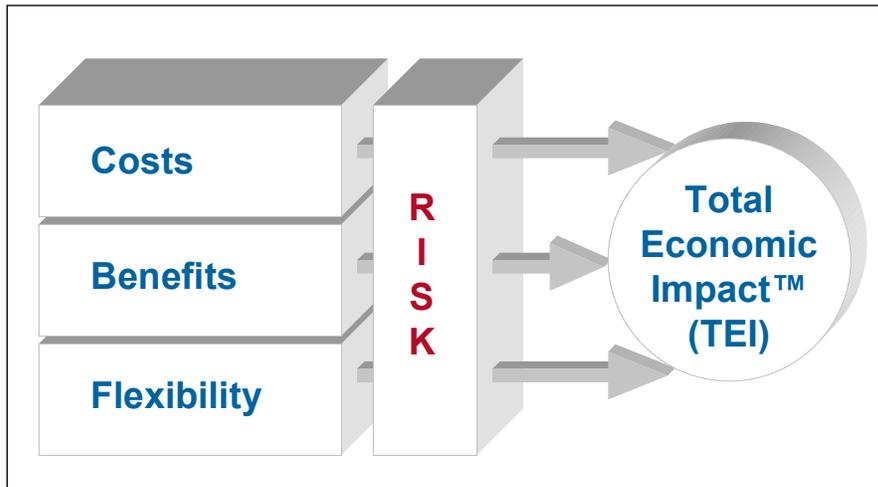
Appendix B: Total Economic Impact™ Primer

Total Economic Impact™ is primarily a common language tool, designed to capture and properly communicate the value of IT initiatives in a common business language. In so doing, TEI considers four elements of any initiative:

1. Benefits
2. Costs (sometimes referred to as total cost of ownership (TCO))
3. Flexibility
4. Risk

The figure below shows the TEI methodology conceptually. Benefits, flexibility and costs are considered, through the filter of risk assessment, in determining an expected ROI for any given initiative.

TEI Conceptual Diagram



Source: Giga Research, a wholly owned subsidiary of Forrester Research, Inc.

Benefits

Benefits represent the *value* delivered to the business by the proposed project. Oftentimes, IT project justification exercises focus on cost (e.g., TCO) and cost reductions. Among industry leaders, IT is deployed as an offensive weapon, with value expectations greater than simple cost reduction, especially when those cost reductions tend to focus within IT. TEI captures the value proposition of the proposed project by measuring the benefits against the incurred costs.

All benefits captured by TEI must be traceable back to one or more critical success factors (CSFs). These CSFs are directly linked to a higher-level business strategy. If a proposed technology investment generates benefits that cannot be satisfactorily linked to a CSF, then it will not be included as a benefit for the organization in the model. In these cases, TEI requires that the benefit be discarded.

Under TEI, benefits may only accrue to the business units. “Benefits” derived through cost reductions within IT accrue as negative TCO to the IT budget, thereby showing a reduced TCO. (TCO is considered by TEI to be a single-dimension, cost-centric focus on the IT budget.)

The TEI process begins with a discovery of potential benefit areas. A representative from the organization under examination who has the ability to capture the benefit in question must validate each benefit captured during discovery. In other words, values cannot arbitrarily be assigned to a benefit if that person is not in a position to deliver that benefit should the project be approved. Additionally, projects that are expected to deliver business value require some effort on the part of the business to realize that value. That effort may be in the form of training, organizational change or a modification of existing business processes. Therefore, TEI requires dialog with the business leaders actually responsible for making the necessary changes, in order to capture the proposed benefit during the justification phase. TEI captures this dialog in the form of the names of the individuals, which validates the value calculation of each benefit.

Within TEI, each benefit entered has a specific capture date. Although the benefit may be captured over time, TEI requires the specification of a date when most of the benefit has been captured. TEI will then place the value delivered in the appropriate time frame within the project.

Costs

Costs represent the investment necessary to capture the value, or benefits, of the proposed project. IT or the business units may incur costs. These may be in the form of fully burdened labor, subcontractors or materials. Additionally, costs consider all the investment and expenses necessary to deliver the value proposed.

Flexibility

Flexibility, as defined by TEI, represents investing in additional capacity that can, for some future additional investment, be turned into business benefit — for instance, an investment in an enterprisewide upgrade of the desktop word processor application where the primary driver may be standardization (to increase efficiency) and licensing (to decrease IT costs). However, a collaborative workgroup feature may translate into greater worker productivity when the organization is ready to absorb the discipline necessary to capture that benefit. The collaboration feature does not promise benefit during this phase of the project and must be captured later, incorporating additional investment, most likely in the form of training. However, the existence of the option has a present value that can be estimated. The flexibility component of TEI captures that value.

Flexibility can also be calculated by acknowledging that management has several decision points along the way for any given project. At each point, management can steer the project to a different outcome or cancel it altogether. Many net present value evaluations fail to take this management flexibility into account. Since TEI's flexibility component uses the industry standard Black-Scholes options formula, the management flexibility factor is taken into consideration.

TEI divides a project into multiple phases. The first phase is considered the “benefits” phase — it is the phase expected to deliver the primary benefits. The benefits phase is usually no more than one budget cycle long and it is the primary reason the project is being considered. All other phases are “options” or “flexibility” phases. For additional investment at some point in the future, business benefit can be captured during these “options” phases. TEI applies the Black-Scholes options pricing equation to all phases other than the benefits phase. The Black-Scholes equation uses five inputs to calculate the present-day value of flexibility or options:

1. The value, or business benefit, that can be captured when the option is exercised; this value is expressed in present value terms.
2. The time, to the date, at which point the option or flexibility expires. Expiration could be due to business changes or technology obsolescence.
3. The cost of the investment to exercise the option and capture benefit.
4. The risk-free interest rate (typically the interest rate of government securities is used).
5. The volatility of the industry or sector; TEI uses the volatility of the stock prices within the market sector as this input.

Risk

Risks are used to widen the possible outcomes of the project. Since the future cannot be accurately predicted, there is risk inherent in any project. TEI captures risk in the form of risks-to-benefits and risks-to-costs.

Risks-to-benefits considers all possible risks to each possible benefit. Likewise, risks-to-costs considers all possible risks to each possible cost. Then, a range is chosen by applying best judgment for each cost and benefit, based on the set of risks assigned to each cost and benefit. The range is entered in the form of a low estimate, a most likely value and a high estimate. For example, the risks to a cost may result in a range from the expected value as the low estimate, to two times the expected value as the high for a particular cost (representing a potential two times cost overrun).

TEI applies a probability density function known as “triangular distribution” to the values entered. The expected value — the mean of the distribution — is used as the risk-adjusted cost or benefit number. The risk-adjusted costs and benefits are then summed to yield a complete risk-adjusted summary and ROI.

Typical project risk factors to consider include the following:

- *Vendors*: The risk that the vendor of a product or technology may need to be replaced at some point during the project duration
- *Products*: The risk that a product will not deliver the functionality expected
- *Architecture*: The risk that the current product architecture will not allow future infrastructure decisions and changes
- *Culture*: The risk that an organization will be unable to absorb the new technology or adapt to its implementation
- *Delays*: The impact on revenues of a project delay or cancellation
- *Size*: The direct correlation of project risk to the size of the project, as measured by application size or budget