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The Total Economic Impact™ Of Windows Server 2008 R2
Multicompany Case Study

Project Director: Michelle Bishop

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Executive Summary

In August 2009, Microsoft commissioned Forrester Consulting to examine the total economic impact and potential return on investment (ROI) that enterprises may realize by deploying Windows Server 2008 R2. Windows Server 2008 R2 is the newest Windows Server operating system from Microsoft. To understand the financial impact of deploying Windows Server 2008 R2, Forrester conducted in-depth interviews with nine actual Microsoft customers. These organizations were all Microsoft TAP customers who are early adopters of Windows Server 2008 R2. Forrester then compiled the results from these interviews into a composite case study of a North American retail and distribution organization of 1,500 employees and $450 million in annual revenue.

In conducting in-depth interviews with nine existing customers, Forrester found that these companies achieved:

- Reduced server hardware costs, facility costs consisting of data center power and space savings, as well as an alternative disaster recovery solution by using Windows Server 2008 R2's server virtualization, Hyper-V.

- Improved storage management efficiencies and space savings due to Clustered Shared Volumes to lower storage costs and labor savings in IT management with virtualization on Windows Server 2008 R2.

- Improved IT management productivity and application availability due to the new Live Migration feature in Windows Server 2008 R2 Hyper-V.

- Greater overall IT management efficiency in Active Directory with improved consoles and capabilities.

- Productivity savings for IT management due to improved remote server management capabilities and automation features, such as PowerShell.

- Improved security, labor savings, and associated lower hardware costs for desktop management by implementing Virtual Desktop Infrastructure (VDI) using Remote Desktop Services on Windows Server 2008 R2 with Windows 7.

- A smooth, secure mobile experience for users as well as cost avoidance savings for an alternative access solution for mobile users and IT management savings by implementing DirectAccess through Windows Server 2008 R2 and Windows 7.

- Productivity savings for IT management as well as bandwidth cost savings for branch offices by implementing BranchCache through Windows Server 2008 R2 and Windows 7.

Purpose

The purpose of this study is to provide readers with a framework to evaluate the potential financial impact of Windows Server 2008 R2 on their organizations. Forrester's aim is to clearly show all calculations and assumptions used in the analysis. Readers should use this study to better understand and communicate a business case for investing in Windows Server 2008 R2.

Methodology

Microsoft selected Forrester for this project because of its industry expertise in infrastructure and operations and Forrester's Total Economic Impact™ (TEI) methodology. TEI not only measures costs and cost reduction (areas that are typically accounted for within IT), but it also weighs the enabling value of a technology in increasing the effectiveness of overall business processes.

For this study, Forrester employed four fundamental elements of TEI in modeling Windows Server 2008 R2:

1. Costs and cost reduction.

2. Benefits to the entire organization.

3. Risk.

4. Flexibility.

Given the increasing sophistication that enterprises have regarding cost analyses related to IT investments including business applications, Forrester's TEI methodology serves an extremely useful purpose by providing a complete picture of the total economic impact of purchase decisions. Please see Appendix A for additional information on the TEI methodology.

Approach

Forrester used a five-step approach for this study:

1. Forrester gathered data from existing Forrester research relative to Windows Server 2008 R2 and the infrastructure and operations market in general.

2. Forrester interviewed Windows Server 2008 R2 product management, marketing, and sales personnel to fully understand the potential (or intended) value proposition of Windows Server 2008 R2.

3. Forrester conducted a series of in-depth interviews with nine organizations currently using Windows Server 2008 R2.

4. Forrester constructed a financial model representative of the interviews. This model can be found in the TEI Framework section below.

5. Forrester created a composite organization based on the interviews and populated the framework using data from the interviews as applied to the composite organization.

Key Findings

Based on our interviews with Microsoft customers, Forrester constructed a composite company, a TEI framework, and an associated ROI analysis. By aggregating the findings from the customer interviews and portraying a composite organization that is achieving value from Windows Server 2008 R2, the study illustrated the financial impact of the Windows Server 2008 R2 solution. The composite company Forrester created, "Lorimcom Incorporated" is a retail and distribution organization headquartered in the Midwest, with branch offices on the East and West Coast. Forrester constructed this company to reflect an organization described as follows:

- A retail and distribution organization with more than $450 million annually in revenue based in North America.

- The organization has an IT infrastructure and operations team of nine engineers and 10 support and customer service staff. The environment supports more than 1,500 users.

- The organization was previously using Windows Server 2003. With the organization's expansion, the company planned a server virtualization project around Windows Server 2008 R2 to serve this growth.

- After the organization completed its project to virtualize its server environment to 150 virtual machines, the organization also implemented VDI, DirectAccess, and BranchCache to select user groups within the company.

Forrester's study yielded the following key findings:

- **ROI.** Based on the interviews with the nine existing customers, Forrester constructed a TEI framework and ROI analysis for the composite organization and projected a risk-adjusted ROI of **189%**, with a breakeven point (payback period) of less than six months after deployment for the composite company. These results are listed in Table 1 below.

- **Benefits.** Benefits accruing to the composite company, which reflects the experience of the organizations interviewed for this study, amount to approximately **$1,676,471** (risk-adjusted, present value) over a three-year period. These financial benefits include lower hardware costs, real estate and power savings, and labor savings through virtualization; IT management savings through Active Directory; IT management savings through remote server management and automation; productivity savings and lower costs through VDI and Remote Desktop Services; cost savings through DirectAccess; and bandwidth cost savings and improved productivity through BranchCache.

- **Costs.** Total costs for the implementation around Windows Server 2008 R2 within the composite company total **$580,696** (risk-adjusted, present value) over the first three years. These costs include Windows Server 2008 R2 license fees, additional server and software license fees, hardware costs, implementation costs, and professional fees for implementation.

Table 1 illustrates the risk-adjusted cash flow for the composite organization based on data and characteristics obtained during the interview process. Forrester risk-adjusts these values to take into account the potential uncertainty that exists in estimating the costs and benefits of a technology investment. The risk-adjusted value is meant to provide a conservative estimation, incorporating any potential risk factors that may later affect the original cost and benefit estimates. For a more in-depth explanation of risk and risk adjustments used in this study, please see the Risk section.

Table 1: Composite Company ROI, Risk-Adjusted

Summary financial results	Original estimate	Risk-adjusted
ROI	221%	189%
Payback period (months)	4.5 months	5.2 months

Total costs (PV)	($555,924)	($580,696)
Total benefits (PV)	$1,783,998	$1,676,471
Total (NPV)	$1,228,074	$1,095,775

Source: Forrester Research, Inc.

Note that calculation totals throughout the study may not align because of rounding.

Forrester found that higher ROIs were associated with organizations that also used Windows Server 2008 R2 for virtualization initiatives in addition to using other features of Windows Server 2008 R2 such as BranchCache and DirectAccess. In addition, organizations that were already on Software Assurance incurred lower costs and, accordingly, a higher return on investment on Windows Server 2008 R2.

Disclosures

The reader should be aware of the following:

- The study is commissioned by Microsoft and delivered by the Forrester Consulting group.

- Microsoft reviewed and provided feedback to Forrester, but Forrester maintains editorial control over the study and its findings and does not accept changes to the study that contradict Forrester's findings or obscure the meaning of the study.

- The customer names for the interviews were provided by Microsoft.

- Forrester makes no assumptions as to the potential return on investment that other organizations will receive. Forrester strongly advises that readers should use their own estimates within the framework provided in the report to determine the appropriateness of an investment in Microsoft and Windows Server 2008 R2.

- This study is not meant to be used as a competitive product analysis.

Windows Server 2008 R2: Overview

Windows Server 2008 R2 is the newest Windows Server operating system from Microsoft.

According to Microsoft, Windows Server 2008 R2 is designed to help organizations reduce operating costs and increase efficiencies. It provides enhanced management control over resources across the enterprise. It is designed to provide better energy efficiency, reliability, and flexibility, helping to reduce power consumption and lower costs. Windows Server 2008 R2 also delivers improved branch office capabilities, an exciting new remote-access work experience, streamlined server management, and it expands Microsoft's virtualization vision.

Windows Server 2008 R2 can help your organization:

- Optimize resources.

- Reduce power consumption.

- Improve branch office performance and management.

- Create dynamic virtual data centers with live migration.

- Save time and speed and simplify deployment.

- Reduce storage costs.

- Help protect data.

- Improve availability.

- Simplify and automate management.

- Reduce TCO for Web and application serving with IIS 7.5.

Windows Server 2008 R2 helps you centralize management tasks and enable your IT professionals to do more using familiar tools and processes reducing the need for further training. It can help ensure that your organization is able to respond quickly to changing demands on your IT infrastructure. It can help your IT professionals recover quickly from Active Directory administrative error. It can help your IT department standardize your installations and help avoid problems due to improper configuration. It can help your IT staff identify and resolve system and network issues before they become noticeable problems. It can help you standardize and automate IT management processes leading to a better automation experience and helping your organization save both time and money. And with new and improved power management features, your organization can easily reduce system power consumption helping both the environment and your bottom line. Windows Server 2008 R2 provides a powerful and easy to use management experience that enables the IT professional to complete tasks quickly and easily whether managing physical or virtual machines either locally or remotely.

Analysis

As stated in the Executive Summary, Forrester took a multistep approach to evaluate the impact that implementing Windows Server 2008 R2 can have on an organization:

- Interviews with Microsoft product management and marketing personnel.

- In-depth interviews of nine organizations currently using Windows Server 2008 R2.

- Construction of a common financial framework for the implementation of Windows Server 2008 R2.

- Construction of a composite organization based on characteristics of the interviewed organizations.

Interview Highlights

A total of nine existing Microsoft customers were interviewed for this study. These organizations were all Microsoft TAP customers who are early adopters of Windows Server 2008 R2. These interviews involved representatives from the following companies:

1. A privately held translation and globalization services company that is a leading provider of language, content, and technology outsourcing services. The organization has headquarters in North America and employees across 26 countries.

2. One of the largest private transportation companies in the world specializing in the luxury industry with offices in New York, New Jersey, Philadelphia, Los Angeles, and San Francisco, along with a global network that provides services in more than 650 cities around the world.

3. The retail distribution arm of a leading oil and gas company. This division operates in an Eastern European region.

4. An Internet company in the Benelux region that provides hosting and other Internet services, managing more than 60,000 domain names and more than 800 servers.

5. A commercial laboratory providing testing and certification services to OEMs with locations in Taiwan, China, and Korea.

6. A technology consulting firm headquartered in the San Francisco Bay Area that helps organizations plan, implement, and support their networking environments.

7. A state university with nine campuses and more than 90,000 students.

8. The technology solutions group of a North American company that is a global leader in providing broadband satellite networks and services for enterprises, governments, small businesses, and consumers.

9. A nonprofit government agency based in Europe that provides consulting and other internationalization services to small and medium enterprises in the country.

The nine in-depth interviews uncovered a number of important insights:

- Organizations that had virtualized around Microsoft Server 2008 R2 and used System Center Virtual Machine Manager and Operations Manager 2008 R2 saw immediate savings in terms of cost avoidance for hardware. Even organizations interviewed that maintained a mix of Microsoft Server 2003, 2008, and 2008 R2 in their server environment saw cost avoidance savings as they could meet growing demand on their infrastructure without purchasing new equipment. As one manager for IT operations notes, "The biggest thing that 2008 R2 is giving us is better hardware utilization. We moved as many lightweight systems as we could to Hyper-V 2008, and the higher-load servers have been migrated to 2008 R2."

- The interviewed organizations consistently cited improved manageability and resulting IT productivity savings around the new features introduced in Microsoft Server 2008 R2. The CIO of one organization said, "We're a midsized company that was pushing the envelope on the technology, and the labor savings were significant for us."

- Improved scripting capabilities for Windows PowerShell were mentioned as a source of productivity savings, especially around major deployments. With 2008 R2, "you can automate tasks with PowerShell scripts across the entire domain and server population."

- Live Migration was also cited as contributing to IT management savings by the organizations interviewed. Live Migration enabled higher availability for these customer systems and contributed to less downtime for these organizations. As one customer expressed, "We don't have to take down applications for maintenance on the physical host servers. We don't need to do this during specific maintenance windows, so we don't have to schedule these outages."

- Storage Management was another strong feature noted by the interviewed organizations as providing significant benefits in terms of IT productivity savings and storage cost savings when compared to their previous environments.

- One customer who had implemented VDI using Windows Server 2008 R2 and Windows 7 noted the benefit of increased security — IT could now centralize management and monitoring of confidential data and access on employee desktops.

- Implementations of DirectAccess and BranchCache in the interviewed organizations were to specific groups of users. These organizations wanted to test these features out before rolling it out companywide (DirectAccess) or for all branch offices (BranchCache). Nevertheless, these organizations all reported savings around productivity and cost avoidance for their selected users.

- While the organizations we interviewed could not quantify power savings specific to Microsoft Windows Server 2008 R2 at the time of the interview because they had no accurate baseline, these organizations expected to be see power savings in the future with the energy efficiency capabilities and power metering features available in R2. One Internet services organization noted that with R2, it could start invoicing its customers for the power they used in the data center.

TEI Framework

From the information provided in the in-depth interviews, Forrester has constructed a TEI framework for those organizations considering implementation of Windows Server 2008 R2. The objective of the framework is to identify the cost, benefit, flexibility, and risk factors that affect the investment decision.

Composite Organization

Based on the interviews with nine existing customers provided by Microsoft, Forrester constructed a TEI framework, a composite company, and an associated ROI analysis that illustrates the areas affected financially. The composite organization that Forrester synthesized from these results (also known as *Lorimcom Incorporated*) represents the equivalent of a US-based retail and distribution firm with 1,500 employees and $450 million in annual revenue. Forrester created this composite company to reflect an organization described as follows.

Environment Prior To Investment

- 95 physical servers in the data center, with the organization planning to replace servers and also expand the server environment to meet the company's growth.

- A server environment running Window 2003 (accounting, file/print, Active Directory, Exchange, SharePoint) .

- IT infrastructure and operations team consisting of nine engineers and 10 help desk staff.

- The organization was not previously covering its Windows Server licenses with Software Assurance.

Reasons For Investment In Windows Server 2008 R2

- IT initiative to improve operational efficiency for the infrastructure and operations team by migration of physical servers to a virtualized environment and by implementing new features available in Windows Server 2008 R2.

- Provide a cost-effective solution for the sales consultants to have access to custom applications and data while on the road and at customer sites.

- Manage costs in the branch office as the company expands.

Framework Assumptions

Table 2 lists the discount rate used in the present value (PV) and net present value (NPV) calculations and time horizon used for the financial modeling.

Table 2: General Assumptions

Ref.	General assumptions	Value
	Discount rate	10%
	Length of analysis	Three years

Source: Forrester Research, Inc.

Organizations typically use discount rates between 8% and 16% based on their current environment. Readers are urged to consult with their finance team to determine the most appropriate discount rate to use within their own organizations.

In addition to the financial assumptions used to construct the cash flow analysis, Table 3 provides salary assumptions used within this analysis.

Table 3: Salary Assumptions

Ref.	Metric	Calculation	Value
A1	Hours per week		40
A2	Weeks per year		52
A3	Hours per year (M-F, 9-5)		2,080
A4	IT engineer (fully loaded cost including benefits)		$85,000
A5	Hourly	(A4/A3)	$40.87
A6	Help desk (fully loaded cost including benefits)		$65,000
A7	Hourly	(A6/A3)	$31.25

Source: Forrester Research, Inc.

Costs

The main cost categories associated with this implementation of Windows Server 2008 R2 and associated software for the composite organization are: a) Windows Server 2008 R2 software; b) additional software including client software; c) hardware costs; d) internal labor costs for implementation; and e) professional implementation fees.

Lorimcom Incorporated implemented Windows Server 2008 R2's Hyper-V to virtualize a part of its server environment. It now maintains 150 virtual servers for its 1,500 users. The current server environment consists of 50 physical servers, which include 14 Hyper-V hosts.

The composite organization also decided to implement Virtual Desktop Infrastructure (VDI) using Remote Desktop Services on Windows Server 2008 R2. The organization reused PCs to connect to hosted Windows 7 desktops for 140 users in its analyst department. *Lorimcom Incorporated* also implemented DirectAccess for 45 sales consultants and BranchCache on its branch office with 50 users. Out of these 50 users at the branch, 20 of these were sales consultants who were also part of the DirectAccess implementation.

Windows Server 2008 R2 License Fees

With server virtualization, the composite organization now has 150 virtual servers. It originally had 95 physical servers, but by decommissioning servers and also purchasing additional high-performance servers, the current server environment now consists of 50 physical servers, 14 of

which are Hyper-V hosts. The composite organization purchased 28 Windows Server 2008 R2 Datacenter Licenses.

To implement Remote Desktop Services client virtualization, the composite organization purchased four Windows Server 2008 R2 Standard Licenses. To implement BranchCache, the organization purchased one Windows Server 2008 R2 Enterprise License for the server at the branch office. It also purchased 1,500 Windows Server 2008 R2 CALs for its users. Software Assurance was purchased for each server software license.

Windows Server 2008 R2 license fees, including software assurance, total **$202,904** for the organization over three years.

Additional Server And Client Software Fees

The composite organization also purchased management software for the new environment. These licenses include one SQL Server 2008, one System Center Operations Manager 2007 R2, and one System Center Configuration Manager 2007 R2. Total cost for these server software licenses with corresponding Software Assurance is **$4,550** over three years.

The composite organization also decided to implement Virtual Desktop Infrastructure (VDI) using Remote Desktop Services on Windows Server 2008 R2 and Windows 7 for 140 users in their analyst department. Apart from the server software licenses listed earlier, *Lorimcom Incorporated* purchased 140 Windows 7 Enterprise licenses with Software Assurance, as well as 140 Virtualized Enterprise Centralized Desktop (VECD) licenses and 140 Virtual Desktop Infrastructure (VDI) Premium Suite licenses. VECD and VDI software is purchased as an annual subscription. This additional software for the VDI implementation for client virtualization cost the composite organization **$74,746** over three years.

Lorimcom Incorporated implemented DirectAccess for 45 sales consultants and BranchCache for 50 users in its branch office. Out of the 50 users at the branch, 20 of these were sales consultants who were also part of the DirectAccess implementation. For the implementation of DirectAccess and BranchCache, *Lorimcom Incorporated* purchased 75 Windows 7 Enterprise licenses. Total cost for these Windows 7 Enterprise licenses with corresponding Software Assurance is **$23,843** over three years.

The total cost of additional server and client software fees, including Software Assurance, is **$103,139** for the organization over three years.

Hardware Costs

To support server virtualization, *Lorimcom Incorporated* purchased 14 Hyper-V host servers at $8,500 each and one management server at $5,500. The total hardware cost to support server virtualization is **$124,500**.

In addition, the composite organization purchased six additional servers for VDI at $8,500 each for a total cost of **$51,000**. For the BranchCache implementation, the composite organization purchased one server at **$8,500**.

The total hardware cost for the composite organization is **$184,000** over three years.

Labor Costs For Implementation

Internal labor costs for implementation include time the organization spent on the planning, testing, implementation, and post-implementation testing.

The time the composite organization spent implementing server virtualization is estimated at 130 days or 1,040 man-hours for their IT infrastructure and operations staff. This includes a four-week rollout done by three IT engineers and three weeks of testing.

The composite organization spent 56 hours of IT engineering time and 140 hours of help desk staff time on the VDI implementation. To implement DirectAccess, the composite organization spent an estimated 24 days or 192 man-hours of IT engineering time.

It is estimated that the organization then spent 10.25 days or 82 man-hours of IT engineering time on implementing BranchCache for one branch office. This includes preplanning and post-implementation testing. The actual rollout of BranchCache was conducted over two days with two IT engineers.

Changes to the server environment also necessitated changes in business processes for the IT infrastructure and operations team. Planning, documenting, and implementing these changes required four weeks of work for one staff at 50% of their time, equivalent to 80 man-hours for one help desk staff.

At a fully loaded cost per hour of $40.87 per IT engineer FTE and $31.25 per IT help desk FTE and 1,370 and 220 hours respectively, the total implementation cost to the composite organization is **$62,861** over three years.

Implementation — Professional Fees

The composite organization spent **$30,000** in professional fees for two consultants in the implementation of virtualization, DirectAccess, and BranchCache through Windows Server 2008 R2.

Total Costs

The costs described above are summarized in Table 4 below. The cost for the implementation amounted to $582,903 over a three-year analysis.

Forrester notes that costs, particularly that of implementation, are highly dependent on the unique configuration of an organization's server infrastructure and client environment. License fees may also vary, depending on customer size and requirements.

Table 4: Total Costs Of Windows Server 2008 R2

Costs	Initial	For Year 2	For Year 3	Total
Windows Server 2008 R2 license fees	(67,635)	(67,635)	(67,635)	(202,904)
Additional server and client software license fees	(34,380)	(34,380)	(34,380)	(103,139)

Hardware costs - server	(184,000)			(184,000)
Implementation costs	(62,861)			(62,861)
Professional fees - implementation	(30,000)			(30,000)
Total	($378,875)	($102,014)	($102,014)	($582,903)

Source: Forrester Research, Inc.

Benefits

"Without question, the benefits of Windows Server 2008 R2 have exceeded the costs."
— CIO, Microsoft customer

"Generally, my staff has been very satisfied with the manageability of 2008 R2 and its improved management capabilities." — Head of IT operations, Microsoft customer

In interviews with Microsoft customers, Forrester identified the following general quantified benefit categories of Microsoft Server 2008 R2: a) lower hardware costs, real estate and power savings, and labor savings through virtualization; b) IT management savings through Active Directory; c) IT management savings through automation and remote management capabilities; d) productivity savings and lower costs through VDI and Remote Desktop Services; e) cost savings through DirectAccess; and f) bandwidth cost savings and improved productivity through BranchCache.

Virtualization

The composite company virtualized its server environment through Microsoft Server 2008 R2, resulting in the following benefits.

Direct Cost Avoidance — Physical Servers

Through virtualization, organizations interviewed lowered their capital costs by reducing the number of physical servers in their data center. Virtualization also circumvented organizations' replacement cycles. These companies avoided the purchase of new replacement servers as their data center requirements grew. One organization that had virtual servers on both 2008 and 2008 R2 still reported savings as they noted that they could avoid the cost of purchase of additional servers by running higher-load servers on 2008 R2.

For the case of the composite organization, *Lorimcom Incorporated* originally had 95 physical servers and with its growing requirements, initially planned to purchase an additional 35 physical servers to meet this growth. Instead, *Lorimcom Incorporated* decided to implement server virtualization. It virtualized its environment to 150 virtual servers and is maintaining 50 physical servers, 14 of which are Hyper-V host servers.

By implementing virtualization through Microsoft Server 2008 R2, the composite organization avoided buying 35 new physical servers for the planned expansion of its server environment. These Workload/Application servers would have cost the organization $6,500 per server, thus saving the organization $227,500 over three years.

Table 5: Direct Cost Avoidance — Physical Servers

Ref.	Metric	Calculation	Per period	Year 2	Year 3	Total
A1	Number of assets		35			
A2	Cost per asset		$6,500			
At	Direct cost avoidance - physical servers	A1 * A2	$227,500			
Ato	Total (original)		$227,500	$0	$0	$227,500

Source: Forrester Research, Inc.

Reduced IT Management Due To Virtualization — Live Migration

"Microsoft Server 2008 R2 is much easier to deploy, manage, and diagnose. And putting System Center Virtual Machine Manager R2 on top of that to manage your machine has been a very big win for us." — CIO, Microsoft customer

Virtualization around Microsoft Server 2008 R2 also resulted in reduced IT management costs for the interviewed organizations. With the implementation, organizations reported less maintenance time and downtime for the virtualized server environment, leading to lower operational costs. Companies noted that they were able to respond faster to incidents despite having fewer resources than before. As one customer interviewed remarked, "I can say that our IT staff is loving it [virtualization around Microsoft Server 2008 R2]. It's running nicely." This organization reported that calls were significantly reduced by 75%, which benefited their small IT team.

Other areas of server management mentioned that could contribute to higher productivity for the IT operations teams were Live Migration and improved patch management for Windows Server 2008 R2. Another customer noted that due to the Live Migration feature, the IT team no longer had to schedule outage for maintenance windows on physical hosts, as operations could be conducted without affecting users, thus reducing downtime and improving productivity.

For the composite organization, the labor savings from reduced IT management due to virtualization on Microsoft Server 2008 R2 are estimated at 1 FTE. At a fully loaded annual compensation of $85,000, this translates to savings of $255,000 over three years.

Table 6: Reduced IT Management Due to Virtualization

Ref.	Metric	Calculation	Per period	Year 2	Year 3	Total
A1	Number of workers (Saved)		1			
A2	Yearly rate per worker		$85,000			
At	Reduced IT management due to virtualization - FTE savings	A1 * A2	$85,000			

Ato	Total (original)		$85,000	$85,000	$85,000	$255,000

Source: Forrester Research, Inc.

Facilities Cost Savings Due To Virtualization

Organizations interviewed also noted that one of the anticipated benefits of Windows Server 2008 R2 was that they would be more efficient in power consumption when compared to Windows Server 2008. However, at the time of the interviews, these organizations could not articulate the benefit of the 2008-R2-specific power savings separate from the general power savings around virtualization of their server environment.

Organizations interviewed that had already virtualized their server environments before Windows Server 2008 R2 still moved to Windows Server 2008 R2 to capitalize on anticipated benefits in power efficiency, stability, and IT management.

In the case of the composite organization, by implementing virtualization of their server environment through Windows Server 2008 R2, *Lorimcom Incorporated* reduced power and cooling costs of $40,000 per year by 50%. In addition, data center space was reduced by 50%, resulting in an estimated $15,000 in real estate savings.

Prior to Windows Server 2008 R2, the composite organization would have needed a special array to measure energy usage. This solution would have cost $700 per device that could support eight servers. In *Lorimcom Incorporated*'s environment of 50 servers, the organization has saved $4,200.

Overall cost savings for real estate and power reduction around virtualization total $109,200.

Table 7: Real Estate And Power Reduction — Virtualization

Ref.	Metric	Calculation	Year 1	Year 2	Year 3	Total
A1	Real estate cost savings		$15,000			
A2	Power bill		$40,000			
A3	Reduction in power due to virtualization		50%			
A4	Cost avoidance of APC device to measure power usage		$4,200			
At	Real estate and power reduction - virtualization	A1 + (A2 * A3) + A4	$39,200	$35,000	$35,000	
Ato	Total (original)		$39,200	$35,000	$35,000	$109,200

Source: Forrester Research, Inc.

IT Productivity Savings From Improved Storage Management

> *"It made a huge difference in management. We used to spend a lot of time managing storage: load balancing, making sure heads did not run out of disk space. With 2008 R2, all of that has gone away. It's really a different world."* — Head of IT operations, Microsoft customer

Organizations noted that one of the major benefits of Windows Server 2008 R2 were IT management savings due to the new failover clustering features, particularly the Cluster Shared Volumes (CSV) component. These features allowed the organizations to have "much more efficient" storage infrastructure around Hyper-V compared with Windows Server 2008. In setting up virtual machines, a "10-step process became a two-step process" and, as one customer noted, "was life-changing for the people doing the work." One organization has gone from managing one volume for each of its 400 virtual machines to 13 volumes for the entire system. In addition, this company organized a scheme to easily separate out page files from the rest of the OS and data on different partitions, enabling them to optimize speed on the Hyper-V clients. Other organizations called out improved GUID management for virtual machines through CSV clustering.

The productivity savings from improved storage management for the composite organization was estimated at .5 FTE of an IT engineer. At a fully loaded annual compensation of $85,000 a year, the total savings over three years is $127,500.

Table 8: IT Productivity Savings — Improved Storage Management

Ref.	Metric	Calculation	Per period	Year 2	Year 3	Total
A1	Number of workers saved due to improvement in clustering and .csv volumes		0.5			
A2	Yearly rate per worker		$85,000			
At	IT productivity savings from improved storage management	A1 * A2	$42,500			
Ato	Total (original)		$42,500	$42,500	$42,500	$127,500

Source: Forrester Research, Inc.

Lower Storage Costs

The new failover clustering features of Microsoft Server 2008 R2 also resulted in storage savings for *Lorimcom Incorporated* in its virtualized environment. By building a more efficient storage infrastructure, the composite organization lowered its storage costs by an estimated 20%. At a cost of $8,000 per terabyte of storage and at a storage level of 6 terabytes for its pre-2008 R2 non-virtualized environment, the composite organization has saved $8,000 in storage costs.

Table 9: Lower Storage Costs

Ref.	Metric	Calculation	Per period	Year 2	Year 3	Total
A1	Original storage costs		$8,000			
A2	Number of terabytes		5			
A3	Percentage lower		20%			
At	Lower storage costs	A1 * A2 * A3	$8,000			
Ato	Total (original)		$8,000	$0	$0	$8,000

Source: Forrester Research, Inc.

Cost Avoidance — Alternative Disaster Recovery Management System

Virtualization around Windows Server 2008 R2 also enabled the interviewed organization to improve their security and disaster recovery capabilities. One organization reported improving data center redundancy from a two-day recovery time to 2 hours and for cases of complete loss and failure, restoration was now possible in 4 hours. Some organizations also noted that they were able to negotiate cheaper data restoration contracts for disaster recovery, while others noted productivity savings using System Center Data Protection Manager.

The benefit to the composite organization in the area of disaster recovery is quantified as the cost avoidance of a contract for an alternate disaster recovery management system. Without virtualization around Windows Server 2008 R2, the composite company would have spent an initial $183,000 setup cost plus an additional $40,000 annually in fees on this disaster recovery contract to achieve the level of disaster recovery that it has now through 2008 R2.

Table 10: Cost Avoidance — Alternate Disaster Recovery Management System

Ref.	Metric	Calculation	Year 1	Year 2	Year 3	Total
A1	One-time cost		183,000			
A2	Annual fees		40,000	40,000	40,000	
At	Cost avoidance - alternative disaster recovery management system	A1 + A2	223,000	40,000	40,000	
Ato	Total (original)		$223,000	$40,000	$40,000	$303,000

Source: Forrester Research, Inc.

IT Productivity Improvement Due To Active Directory Manageability Improvements

Windows Server 2008 R2 introduced new management consoles that saved IT administrators' time in performing routine and complex tasks. Interviewed customers also note that Windows Server 2008 R2 now also supports restoration of accidentally deleted Active Directory objects without going through a lengthy restore process. One organization noted that in its previous environment, the process of restoring an accidentally deleted Active Directory object — which would include isolating the server and synchronizing processes — would have taken at least one day of work. The benefit from the introduction of the Active Directory Recycle Bin in Windows Server 2008 R2 is reduction in downtime.

For the composite organization, this benefit of productivity enhancements of Active Directory is conservatively estimated at a 5% productivity improvement for half of its system engineers. At a fully loaded cost of $85,000 per FTE, total benefit is $51,000 over three years.

Table 11: IT Productivity Improvement — Active Directory

Ref.	Metric	Calculation	Per period	Year 2	Year 3	Total
A1	Number of workers		4			
A2	Yearly rate per worker		$85,000			
A3	Percent productivity improvement		5%			
At	IT productivity improvement due to Active Directory	A1 * A2 * A3	$17,000			
Ato	Total (original)		$17,000	$17,000	$17,000	$51,000

Source: Forrester Research, Inc.

IT Productivity Improvement Due To Server Management

Microsoft Server 2008 R2 helped automate IT management tasks, thereby reducing operational costs for the interviewed organizations. One area noted by these companies was new scripting capabilities under Windows PowerShell that reduced the steps needed for deployment and data retrieval domainwide. "It's a huge advantage. You can now create one script and easily deploy a new package throughout the whole data center without having to log on to every different server and deploy it individually," a senior system engineer noted.

For *Lorimcom Incorporated*, the productivity savings from these server management benefits are conservatively estimated at saving 15% of an engineer's time over the course of a year. With a team of nine IT engineers for the composite organization at a fully loaded compensation of $85,000 per FTE, the IT productivity improvement due to remote server management totals **$344,250** over three years.

Table 12: IT Productivity Improvement — Remote Server Management

Ref.	Metric	Calculation	Per period	Year 2	Year 3	Total
A1	Number of workers		9			
A2	Yearly rate per worker		$85,000			
A3	IT productivity improvement due to Remote Desktop Services		15%			
At	IT productivity improvement due to Remote Server Management	A1 * A2 * A3	$114,750			
Ato	Total (original)		$114,750	$114,750	$114,750	$344,250

Source: Forrester Research, Inc.

Remote Desktop Services

Improved IT Administration Due To Remote Desktop Services With Windows Server 2008 R2 And Windows 7

Organizations interviewed also reported benefits from Remote Desktop Services (RDS) in Windows Server 2008 R2 in giving users the ability to work remotely and making IT administration easier for their staff. The accounting staff for one customer now had the option to work remotely from their home machines on financial applications that they did not have access to previously. Another organization used RemoteApp and RDS to set up an RDS server with management software such as Virtual Machine Manager, Operations Manager Console, Failover Cluster Manager, and others. This provided their team of system administrators with "a single point for all IT tasks" and the ability to manage systems without the need for a local machine. As one customer noted, "All of the documents are saved on the server. RemoteApp and RDS take away the concern of your local machine blowing up."

Organizations interviewed also anticipated seeing more benefits around efficiency with their planned implementations of RDS and RemoteApp as a distribution mechanism for applications. With these features implemented, organizations will have the ability to quickly publish applications to their user base. Organizations noted that the configuration time will vary depending on the applications, and Windows 7 was a requirement for these implementations. While the organizations could not quantify the benefits at this time, customers interviewed did expect to see productivity savings in the future from RDS and RemoteApp.

Improved Security Due To Remote Desktop Services With Windows Server 2008 R2 And Windows 7

Remote Desktop Services (RDS) in Windows Server 2008 R2 supports a Virtual Desktop Infrastructure (VDI) architecture , which extends the functionality of Windows Server 2008's Terminal Services to deliver virtualized desktops and applications to employees' devices. By

deploying desktop virtualization through RDS, organizations have the opportunity to see hardware and software cost savings, as well as IT management savings.

One organization we interviewed noted that they had NDA contracts with their customers to keep prototype and release data secure. In their case, this was important, as internal teams were serving different customers who were also competitors in certain markets. By implementing remote desktop virtualization through Windows Server 2008 R2 and Windows 7, this organization was able to centralize monitoring of important data, define user access for important customer information, and provide a more secure setup as required by its customer agreements.

The composite organization chose to use RDS to virtualize the PCs of the analyst department rather than replace these with new computers to run Windows 7. The composite organization virtualized Windows 7 in the Windows Server 2008 R2 server for 140 users. With this desktop virtualization, the organization was able to provide a good user experience to the analyst department for Windows 7, save the cost of the PC refresh, and allow the IT team to manage these desktops in a more centralized and secure manner.

The benefit from RDS for the composite organization is quantified as cost savings from avoiding the cost of a PC refresh for its 140 users in the analyst department. At $1,200 per PC hardware replacement, *Lorimcom Incorporated* has saved $168,000 in three years.

Table 13: Direct Cost Avoidance — PC Refresh

Ref.	Metric	Calculation	Per period	Year 2	Year 3	Total
A1	Number of assets		140			
A2	Cost per asset		$1,200			
At	Direct cost avoidance - PC refresh	A1 * A2	$168,000			
Ato	Total (original)		$168,000	$0	$0	$168,000

Source: Forrester Research, Inc.

DirectAccess With Windows Server 2008 R2 And Windows 7

> "*As for end user satisfaction, it is extremely high with* these *new capabilities. For the 80% of our employees who are in the field, their mobile experience is now seamless and they have access to the resources they need without having to use VPNs.*"
> — CEO of consulting firm, Microsoft customer

DirectAccess is a new feature of Windows 7 and Windows Server 2008 R2 that enables remote users to securely access shared resources, Web sites, and applications on an internal network without connecting to a virtual private network (VPN).

The organizations Forrester interviewed that implemented DirectAccess had used this feature to improve productivity for certain user groups with mobility requirements such as consultants working on client sites or sales personnel.

"We use DirectAccess to increase our sales productivity and efficiency," one organization noted. The sales process for this particular organization relied on quickly providing time-sensitive and confidential engineering data and quotations to close a sale. In the organization's prior environment, sales had to travel back to the office or coordinate over the phone with staff in the home office from a different time zone to obtain this information. With DirectAccess, the sales team could immediately and securely access the required data for their prospects. This particular customer reported that upon a pilot deployment to sales, revenue increased by 5% after three months. This was attributed to the ability to quickly provide relevant information that the customer required through DirectAccess. This customer also estimated that a full deployment to its worldwide sales team would save between 10% and 15% of the team members' time since prior to DirectAccess, sales personnel would have had to travel back to the home office to obtain data for their prospects.

For the purposes of this study, the benefit to the composite organization from DirectAccess is conservatively estimated as a function of cost avoidance for an alternative mobile access solution as well as a function of management savings for its IT team.

Cost Avoidance — Alternative Mobile Access Solution

By implementing DirectAccess to 45 members of its sales force, *Lorimcom Incorporated* avoided the cost of implementing an alternative mobile access solution to replace a legacy solution for these users. The cost of the VPN appliance to support this alternative mobile access solution is $20,000. The composite organization also avoids the cost of the software, services, and licensing to the organization at $40,000 per year. The total cost avoidance savings of an alternative mobile access solution is valued at $140,000 over three years.

Table 14: Cost Avoidance — DirectAccess Alternative Solution

Ref.	Metric	Calculation	Year 1	Year 2	Year 3	Total
A1	VPN appliance		20,000	0	0	
A2	Software, services, and licensing		40,000			
At	Cost avoidance - alternative mobile access solution	A1 + A2	60,000	40,000	40,000	
Ato	Total (original)		$60,000	$40,000	$40,000	$140,000

Source: Forrester Research, Inc.

Cost Avoidance — IT Management

The composite organization also saw management savings for its IT team due to the use of DirectAccess. IT engineers could manage the PCs of mobile workers as easily as it could the desktops of users in the corporate network. This saved the one IT engineer responsible for these PCs 7 hours a week. For one year, these savings translates to 364 hours saved. At an hourly rate per FTE of $40.87, the total IT management savings for the composite organization over three years is $44,625.

Table 15: IT Management Savings – DirectAccess

Ref.	Metric	Calculation	Per period	Year 2	Year 3	Total
A1	Number of workers		1			
A2	Hourly rate per worker		$40.87			
A3	Number of hours (saved)		364			
At	IT management savings due to DirectAccess	A1 * A2 * A3	14,875			
Ato	Total (original)		$14,875	$14,875	$14,875	$44,625

Source: Forrester Research, Inc.

BranchCache With Windows Server 2008 R2 And Windows 7

"*The real benefit for us is that users really appreciate that they are receiving their data sooner. It works better for them now.*" — IT services manager, Microsoft customer

BranchCache in Windows Server 2008 R2 and Windows 7 Enterprise/Windows 7 Ultimate enables copies of data accessed from an organization's intranet Web and file servers to be cached locally within the branch office. When another client on the same network requests the file, the client downloads it from the local cache without downloading the same content across the WAN. BranchCache can be operated in two modes: as a distributed cache where PCs host the data or as a centrally hosted cache where the cached data lives on a server at the branch office. The reader should note that BranchCache is supported on Windows 7 Enterprise and higher editions.

An organization interviewed that implemented BranchCache had noted that benefits included: 1) productivity savings, as users at the branch offices were able to access their data faster, and 2) cost avoidance of bandwidth upgrade to get the level of performance that they now have with BranchCache.

One organization with branch offices in different countries noted that BranchCache was one feature of Windows Server 2008 R2 where it could immediately justify the cost of the software, since the organization halted a planned bandwidth upgrade and implemented BranchCache instead. The organization found that BranchCache improved access time for users in the branch offices by 60%, when the planned bandwidth upgrade had only a 20% expected improvement.

Cost Avoidance — Bandwidth Upgrade

The composite organization, *Lorimcom Incorporated*, initially planned a $30,000 bandwidth upgrade to meet access requirements at the branch and would have had to incur bandwidth costs in subsequent years. Instead, the composite organization implemented BranchCache for one branch office. The organization set up a hosted cache, with a server running Microsoft Windows Server 2008 R2 at the branch. Windows 7 Enterprise was installed on all desktops at the branch office. This will save the company $90,000 over three years.

Table 16: Bandwidth Upgrade Cost Avoidance — BranchCache

Ref.	Metric	Calculation	Per period	Year 2	Year 3	Total
A1	Number of assets		1			
A2	Cost per asset		$30,000			
At	Direct bandwidth cost avoidance due to BranchCache	A1*A2	30,000			
Ato	Total (original)		$30,000	$30,000	$30,000	$90,000

Source: Forrester Research, Inc.

Productivity Savings Due To BranchCache

With the ability to access important data faster, Forrester estimates that the productivity for users at the composite organization's branch office improved by 5%. The composite organization had 50 users working at the branch with an average fully loaded compensation of $60,000 per FTE. To arrive at a more conservative estimate, it is assumed that only 50% of this time saved is used for productive work. As BranchCache was implemented, the total savings for the 50 users of BranchCache in the composite organization is $112,500 over three years.

Table 17: Productivity Savings — BranchCache

Ref.	Metric	Calculation	Per period	Year 2	Year 3	Total
A1	Number of workers		25			
A2	Annual fully loaded compensation per FTE		$60,000			
A3	Percentage productivity improvement		5%			
A4	Percent captured		50%			
At	Incremental output per worker due to BranchCache	A1*A2*A3*A4	$37,500			
Ato	Total (original)		$37,500	$37,500	$37,500	$112,500

Source: Forrester Research, Inc.

Total Benefits — Quantified

The sum of the benefits of Windows Server 2008 R2 accruing to the composite company, *Lorimcom Incorporated*, is $2,093,075. Readers of this study should recall that Forrester has

calculated only the benefits that the interviewed Microsoft customers have experienced and were able to quantify within a range of estimates. Readers who are considering implementing the Windows Server 2008 R2 solution should use this study as a starting point for their organization's business case for Windows Server 2008 R2; there may be other quantifiable benefits of Windows Server 2008 R2 particular to your organization that have not been quantified herein.

Table 18 summarizes the annual, total, and present value of the benefits described above.

Table 18: Benefits Summary

Benefits	Initial	Year 1	Year 2	Year 3	Total
Direct cost avoidance - physical servers		227,500			227,500
Reduced IT management due to vrtualization - FTE savings		85,000	85,000	85,000	255,000
Facilities cost reduction - virtualization		39,200	35,000	35,000	109,200
Productivity savings from improved storage management		42,500	42,500	42,500	127,500
Lower storage costs		8,000			8,000
Cost avoidance - alternative disaster recovery management system		223,000	40,000	40,000	303,000
IT productivity improvement due to Active Directory		17,000	17,000	17,000	51,000
IT productivity improvement due to Remote Server Management		114,750	114,750	114,750	344,250
Direct cost avoidance - PC refresh		168,000			168,000
Cost avoidance - alternative mobile access solution		60,000	40,000	40,000	140,000
IT management savings due to Direct Access		14,875	14,875	14,875	44,625
Direct bandwidth cost avoidance due to BranchCache		30,000	30,000	30,000	90,000
Incremental output per worker due to BranchCache		75,000	75,000	75,000	225,000
Total		$1,104,825	$494,125	$494,125	$2,093,075

Source: Forrester Research, Inc.

Risk

Risk is the third component within the TEI model; it is used as a filter to capture the uncertainty surrounding different cost and benefit estimates. If a risk-adjusted ROI still demonstrates a compelling business case, it raises confidence that the investment is likely to succeed because 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 values considering risk. In general, risks affect costs by raising the original estimates, and they affect benefits by reducing the original estimates.

For the purpose of this analysis, Forrester risk-adjusts cost and benefit estimates to better reflect the level of uncertainty that exists for each estimate. The TEI model uses a triangular distribution method to calculate risk-adjusted values. To construct the distribution, it is necessary to first estimate the low, most likely, and high values that could occur within the current environment. The risk-adjusted value is the mean of the distribution of those points.

For example, take the case of Windows Server 2008 R2 implementation costs. The $62,861 value used in this analysis can be considered the "most likely" or expected value. Implementation costs may vary based on the number of users, server configuration, and the like. This variability represents a risk that must be captured as part of this study. Forrester uses a risk factor of 160% on the high end, 100% as the most likely, and 100% on the low end. This has the effect of increasing the cost estimate to take into account the fact that original cost estimates are more likely to be revised upward than downward. Forrester then creates a triangular distribution to reflect the range of expected costs, with 120% as the mean (120% is equal to the sum of 160%, 100%, and 100% divided by three). Forrester applies this mean to the most likely estimate, $62,861, to arrive at a risk-adjusted value of $75,433.

The following risks were considered in this study:

- **Implementation risks.** Risk factors for internal implementation due to variability are higher than risks for using external implementation resources, as risks for the latter can be mitigated through contracts.

- **Productivity savings**. Forrester risk-adjusted for variability in IT management savings and productivity savings.

- **Cost avoidance savings.** Variability in the requirements for cost avoidance savings on the alternative disaster recovery solution, alternative mobile access solution, and bandwidth were considered in the risk-adjusted estimates.

The following tables show the values used to adjust for uncertainty in cost and benefit estimates. Different cost and benefit estimates have different levels of risk adjustments, depending on variability and other factors. Readers are urged to apply their own risk ranges based on their own degree of confidence in the cost and benefit estimates.

Table 19: Risk Factors — Costs And Benefits

	Factor	Low	Orig.	High	Mean
Costs	Windows Server 2008 R2 license fees	100%	100%	100%	100%
	Additional software license fees	100%	100%	100%	100%
	Hardware costs - server	100%	100%	115%	105%
	Implementation costs	100%	100%	160%	120%
	Professional fees – implementation	100%	100%	130%	110%
Benefits	Direct cost avoidance - physical servers	100%	100%	100%	100%
	Reduced IT management due to virtualization - FTE savings	80%	100%	100%	93%
	Real estate and power reduction - virtualization	80%	100%	100%	93%
	Productivity savings from improved storage management	90%	100%	100%	97%
	Lower storage costs	100%	100%	100%	100%
	Cost avoidance - alternative disaster recovery management system	50%	100%	100%	83%
	IT productivity improvement due to Active Directory	80%	100%	100%	93%
	IT productivity improvement due to Remote Server Management	80%	100%	100%	93%
	Direct cost avoidance - PC refresh	100%	100%	100%	100%
	Cost avoidance - alternative mobile access solution	90%	100%	100%	97%
	IT management savings due to DirectAccess	80%	100%	100%	93%
	Direct bandwidth cost avoidance due to BranchCache	80%	100%	100%	93%
	Incremental output per worker due to BranchCache	95%	100%	100%	98%

Source: Forrester Research, Inc.

The risk factors in Table 19 are applied to the benefits and costs listed earlier, resulting in the risk-adjusted cost and benefit values in Tables 20 and 21:

Table 20: Total Costs — Risk-Adjusted

Costs	Initial	For Year 2	For Year 3	Total	Present value
Windows Server 2008 R2 license fees	(67,635)	(67,635)	(67,635)	(202,904)	(185,017)
Additional client and server software license fees	(34,380)	(34,380)	(34,380)	(103,139)	(94,046)
Hardware costs - server	(193,200)			(193,200)	(193,200)
Implementation costs	(75,433)			(75,433)	(75,433)
Professional fees - implementation	(33,000)			(33,000)	(33,000)
Total	($403,647)	($102,014)	($102,014)	($607,675)	($580,696)

Source: Forrester Research, Inc.

Table 21: Total Benefits — Risk-Adjusted

Benefits	Year 1	Year 2	Year 3	Total	Present value
Direct cost avoidance - physical servers	227,500			227,500	206,818
Reduced IT management due to virtualization - FTE savings	79,050	79,050	79,050	237,150	196,586
Facilities cost reduction - virtualization	36,456	32,550	32,550	101,556	84,498
Productivity savings from improved storage management	41,225	41,225	41,225	123,675	102,520
Lower storage costs	8,000			8,000	7,273
Cost avoidance - alternative disaster recovery management system	185,090	33,200	33,200	251,490	220,645
IT productivity improvement due to Active Directory	15,810	15,810	15,810	47,430	39,317
IT productivity improvement due to Remote Server Management	106,718	106,718	106,718	320,153	265,391
Direct cost avoidance - PC refresh	168,000			168,000	152,727
Cost avoidance - alternative mobile access solution	58,200	38,800	38,800	135,800	114,126

IT management savings due to Direct Access	13,834	13,834	13,834	41,501	34,402
Direct bandwidth cost avoidance due to BranchCache	24,000	24,000	24,000	72,000	59,684
Incremental output per worker due to BranchCache	71,250	71,250	71,250	213,750	177,188
Total	$919,160	$402,800	$402,800	$1,724,760	$1,471,122

Source: Forrester Research, Inc.

Flexibility

Flexibility, as defined by Forrester's TEI methodology, represents an investment in additional capacity or agility today that can be turned into future business benefits at some additional cost. This provides an organization with the "right" or the ability to engage in future initiatives, but not the obligation to do so.

Although data for calculating the value of several flexibility options is insufficient at this time, Forrester identified the following areas that present flexibility options for the composite organization through Windows Server 2008 R2:

- As the organization expands and the infrastructure grows with it, the composite organization may see additional server and storage cost savings in the future through the operational efficiency and capacity made available by virtualization around Windows Server 2008 R2. By using the Windows Server 2008 R2 Datacenter license in its Hyper-V environment, it can provision new servers rapidly and only have to pay for additional Windows Server licenses when it adds more physical servers.

- Expansion of Remote Desktop Services to larger user groups within the organization by publishing a RemoteApp menu to user desktops will allow the IT infrastructure and operations team to easily publish and distribute applications to its entire client base.

- Expansion of the BranchCache feature to all branches of the organization will contribute to more IT management savings, bandwidth savings, and larger productivity savings for the users located at these branches.

- Expansion of DirectAccess to more mobile users will also correspond to additional cost avoidance savings, IT management savings, and improved productivity for mobile users.

The value of flexibility is unique to each organization, and the willingness to measure its value varies from company to company (see Appendix A for additional information regarding the flexibility calculation).

TEI Framework: Summary

Considering the financial framework constructed above, the results of the costs, benefits, risk, and flexibility sections using the representative numbers can be used to determine a return on investment, net present value, and payback period. Table 22 shows the consolidation of the numbers for the composite organization.

Annual software costs per year are incurred at the end of the previous year. In the financial model, software costs for Year 3 are listed under Year 2.

Table 22: Total Costs And Benefits, Non Risk-Adjusted

Ref.	Project cash flow	Calculation	Initial cost	Year 1	Year 2	Year 3	Total	PV/NPV
E1	Total costs		($378,875)	($102,014)	($102,014)	$0	($582,903)	($555,924)
F1	Total benefits		$0	$1,104,825	$494,125	$494,125	$2,093,075	$1,783,998
G1	Net savings		($378,875)	$1,002,811	$392,111	$494,125	$1,510,172	$1,228,074
H1	ROI	(F1-E1)/E1						221%

Source: Forrester Research, Inc.

Tables 23 shows the risk-adjusted values, applying the risk adjustment method indicated in the Risks section.

Table 23: Total Costs And Benefits, Risk-Adjusted

Ref.	Project cash flow	Calculation	Initial cost	Year 1	Year 2	Year 3	Total	PV/NPV
J1	Total costs		($403,647)	($102,014)	($102,014)	$0	($607,675)	($580,696)
K1	Total benefits		$0	$1,041,282	$462,586	$462,586	$1,966,455	$1,676,471
L1	Net savings		($403,647)	$939,268	$360,572	$462,586	$1,358,780	$1,095,775
M1	ROI	(K1-J1)/J1						189%

Source: Forrester Research, Inc.

It is important to note that values used throughout the TEI Framework are based on in-depth interviews with nine organizations and the resulting composite organization built by Forrester. Forrester makes no assumptions as to the potential return that other organizations will receive within their own environment. Forrester strongly advises that readers use their own estimates within the framework provided in this study to determine the expected financial impact of implementing Windows Server 2008 R2.

Study Conclusions

Forrester's in-depth interviews with Windows Server 2008 R2's customers yielded several important observations. Forrester found that organizations can realize benefits in the form of:

- Server virtualization on Windows Server 2008 R2 will result in savings in hardware, an alternative disaster recovery solution, and real estate and power costs. The improved storage management capability through new failover clustering features also lead to lower storage costs and labor savings in IT management.

- Improved IT management productivity and application availability due to features in Windows Server 2008 R2 such as Live Migration, Active Directory, PowerShell, and other automation and remote management features.

- Improved IT management for Remote Desktop Services (RDS) and RemoteApp. Lower hardware costs and improved IT management through implementing Virtual Desktop Infrastructure (VDI) through RDS on Windows Server 2008 R2 and Windows 7.

- A smooth, secure mobile experience for users, as well as cost avoidance savings for an alternative mobile access solution and IT management savings by implementing DirectAccess through Windows Server 2008 R2 and Windows 7.

- Productivity savings for IT engineers as well as bandwidth cost savings for branch offices by implementing BranchCache through Windows Server 2008 R2 and Windows 7.

The financial analysis provided in this study illustrates how an organization may evaluate the value proposition of Windows Server 2008 R2. Based on information collected in nine customer interviews, Forrester calculated a three-year risk-adjusted ROI of 189% for *Lorimcom Incorporated*, the composite organization, with a payback period of less than six months. All final estimates are risk-adjusted to incorporate potential uncertainty in the calculation of costs and benefits.

Based on these findings, companies looking to implement Windows Server 2008 R2 can see management savings for their IT team; benefits from virtualization such as hardware, real estate, and power costs savings, user productivity savings, and other avoided costs savings. Using the TEI framework, many companies may find the potential for a compelling business case to make such an investment.

Table 24: ROI, Original And Risk-Adjusted

Summary financial results	Original estimate	Risk-adjusted
ROI	221%	189%
Payback period (months)	4.5 months	5.2 months
Total costs (PV)	($555,924)	($580,696)
Total benefits (PV)	$1,783,998	$1,676,471
Total (NPV)	$1,228,074	$1,095,775

Source: Forrester Research, Inc.

Appendix A: Total Economic Impact™ Overview

Total Economic Impact is a methodology developed by Forrester Research that enhances a company's technology decision-making processes and assists vendors in communicating the value proposition of their products and services to clients. The TEI methodology helps companies demonstrate, justify, and realize the tangible value of IT initiatives to both senior management and other key business stakeholders.

The TEI methodology consists of six components to evaluate investment value: benefits, costs, risks, and flexibility. For the purpose of this analysis, the impact of flexibility was not quantified.

Benefits

Benefits represent the value delivered to the user organization — IT and/or business units — by the proposed product or project. Often product or project justification exercises focus just on IT cost and cost reduction, leaving little room to analyze the effect of the technology on the entire organization. The TEI methodology and the resulting financial model place equal weight on the measure of benefits and the measure of costs, allowing for a full examination of the effect of the technology on the entire organization. Calculation of benefit estimates involves a clear dialogue with the user organization to understand the specific value that is created. In addition, Forrester also requires that there be a clear line of accountability established between the measurement and justification of benefit estimates after the project has been completed. This ensures that benefit estimates tie back directly to the bottom line.

Costs

Costs represent the investment necessary to capture the value, or benefits, of the proposed project. IT or the business units may incur costs in the forms of fully burdened labor, subcontractors, or materials. Costs consider all the investments and expenses necessary to deliver the proposed value. In addition, the cost category within TEI captures any incremental costs over the existing environment for ongoing costs associated with the solution. All costs must be tied to the benefits that are created.

Risk

Risk measures the uncertainty of benefit and cost estimates contained within the investment. Uncertainty is measured in two ways: the likelihood that the cost and benefit estimates will meet the original projections and the likelihood that the estimates will be measured and tracked over time. TEI applies a probability density function known as "triangular distribution" to the values entered. At a minimum, three values are calculated to estimate the underlying range around each cost and benefit.

Flexibility

Within the TEI methodology, direct benefits represent one part of the investment value. While direct benefits can typically be the primary way to justify a project, Forrester believes that organizations should be able to measure the strategic value of an investment. Flexibility represents the value that can be obtained for some future additional investment building on top of the initial investment already made. For instance, an investment in an enterprisewide upgrade of an office productivity suite can potentially increase standardization (to increase efficiency) and reduce licensing costs. However, an embedded collaboration feature may translate to greater worker productivity if activated. The collaboration can only be used with additional investment in training at some future point in time. However, having the ability to capture that benefit has a present value that can be estimated. The flexibility component of TEI captures that value.

Appendix B: Glossary

Discount rate: The interest rate used in cash flow analysis to take into account the time value of money. Although the Federal Reserve Bank sets a discount rate, companies often set a discount rate based on their business and investment environment. Forrester assumes a yearly discount rate of 10% for this analysis. Organizations typically use discount rates between 8% and 16% based on their current environment. Readers are urged to consult their organization to determine the most appropriate discount rate to use in their own environment.

Net present value (NPV): The present or current value of (discounted) future net cash flows given an interest rate (the discount rate). A positive project NPV normally indicates that the investment should be made, unless other projects have higher NPVs.

Present value (PV): The present or current value of (discounted) cost and benefit estimates given at an interest rate (the discount rate). The PV of costs and benefits feed into the total net present value of cash flows.

Payback period: The breakeven point for an investment, or the point in time at which net benefits (benefits minus costs) equal initial investment or cost.

Return on investment (ROI): A measure of a project's expected return in percentage terms. ROI is calculated by dividing net benefits (benefits minus costs) by costs.

A Note On Cash Flow Tables

The following is a note on the cash flow tables used in this study (see the Example Table below). The initial investment column contains costs incurred at "time 0" or at the beginning of Year 1. Those costs are not discounted. All other cash flows in Years 1 through 3 are discounted using the discount rate shown in Table 2 at the end of the year. Present value (PV) calculations are calculated for each total cost and benefit estimate. Net present value (NPV) calculations are not calculated until the summary tables and are the sum of the initial investment and the discounted cash flows in each year.

Example Table

Ref.	Category	Calculation	Initial cost	Year 1	Year 2	Year 3	Total

Source: Forrester Research, Inc.

Appendix C: About The Project Director

Michelle Bishop
Project Director

Michelle Bishop is a consultant with Forrester's Total Economic Impact™ (TEI) consulting practice. The TEI methodology focuses on measuring and communicating the value of IT and business decisions and solutions as well as providing an ROI business case based on the costs, benefits, risks, and flexibility of investments.

Prior to joining Forrester, Michelle held leadership roles in operations, technology, and marketing in such large organizations as Shell and Avaya. At Shell, she was a product manager for LPG retail distribution initiatives, as well as project lead for quality and information security at Shell Philippines. While working at Avaya, she led the inventory reduction program and consulted on various after-market operations projects. Michelle also came to Forrester with process improvement and account management experience in high-growth startups in media and digital services.

Michelle holds an M.B.A. from the Massachusetts Institute of Technology and a B.S. in industrial engineering from the University of the Philippines.