

A Forrester Total Economic  
Impact™ Study  
Commissioned By  
Microsoft

Project Director:  
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# The Total Economic Impact™ Of Microsoft Windows Server 2012 R2

Cost Savings And Business Benefits  
Enabled When Upgrading To  
Windows Server 2012 R2

FORRESTER®

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### ABOUT FORRESTER CONSULTING

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## Executive Summary

Microsoft commissioned Forrester Consulting to conduct a Total Economic Impact™ (TEI) study and examine the potential return on investment (ROI) that enterprises with current volume licenses may realize by upgrading to Windows Server 2012 R2 with System Center 2012 R2.

To better understand the benefits, costs, and risks, Forrester interviewed six customers who have upgraded to Windows Server 2012 R2 from Windows Server 2008 or 2012, and who manage those servers with System Center 2012 R2.

**“Our goal is to manage both cloud and internal resources or servers from a single pane of glass, leveraging System Center 2012 R2 — VMM. An important part of that strategy is to make sure everything is on 2012 R2, or at least as much of it as possible.”**

**~VP, global IT, facility management service provider**

Windows Server 2012 R2 along with System Center 2012 R2 increased agility by making infrastructure easier to deploy and easier to grow and shrink. The key benefits that were highlighted include cost savings with software-defined storage (SDS), improved scale and performance of large workloads with built-in virtualization, and increased agility and mobility with software-defined networking (SDN). Customers were able to take advantage of these new features to reduce and avoid software and hardware costs, reduce management costs, streamline and reduce storage costs, and deliver better services to customers and employees. While this study focuses on the upgrade to R2, an earlier Forrester TEI study focused on the costs and benefits of migrating to WS 2012 from a non-current volume license or alternative server solution, and highlights from that study are referenced.<sup>1</sup>

### MICROSOFT WINDOWS SERVER 2012 R2 HELPS IMPROVE VIRTUALIZATION AND REDUCE MANAGEMENT COSTS

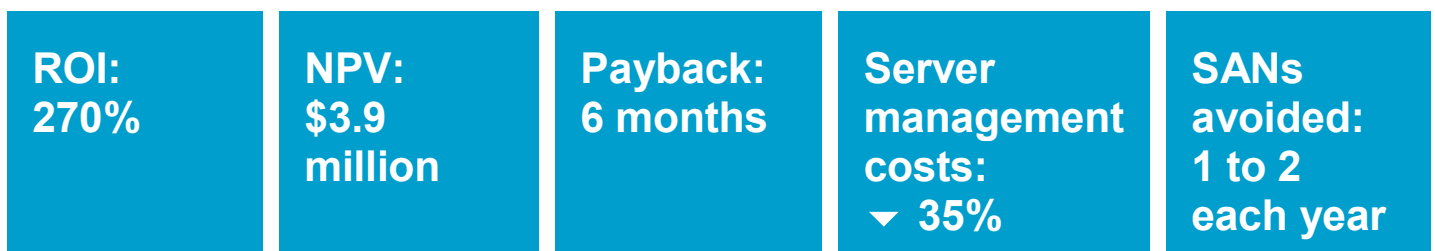
Interviews with six existing customers of Windows Server 2012 R2 and subsequent financial analysis found that a composite organization based on these interviewed organizations experienced the risk-adjusted ROI, benefits, and costs shown in Figure 1.<sup>2</sup> See Appendix A for a description of the composite organization.

The composite organization analysis points to a risk-adjusted ROI of 270% with benefits of almost \$2 million to \$2.4 million per year versus implementation costs of \$1.1 million and low incremental annual costs of \$135,000 per year. This adds up to a risk-adjusted net present value (NPV) of \$3,939,054 and a quick payback of six months.

With Windows Server 2012 R2, the representative organization decreased Windows Server management costs by 35%, has retired two SAN (storage area network) appliances supporting tier two applications, and plans to retire two more during the three years after upgrade, and saved \$575,000 to \$1 million per year in avoided redundant third-party license costs.

**FIGURE 1**

**Financial Summary Showing Three-Year Risk-Adjusted Results for Representative Organization**



Source: Forrester Research, Inc.

› **Benefits.** The composite organization experienced the following risk-adjusted benefits that represent those experienced by the interviewed companies:

- **Avoided license costs of \$700,000 in the first year and \$200,000 per year in subsequent years with updated and new features in Windows Server 2012 R2 with System Center 2012 R2.** The composite organization, reflecting many interviewed organizations, used other management and virtualization solutions, but feels that 2012 R2 releases of Windows Server and System Center not only meet but exceed the capabilities and cost savings, making alternative solutions redundant.
- **IT server management cost savings of more than \$402,220 per year.** The representative organization, with its team of 20 FTEs managing server tasks, has saved significant time — a total of 35% across all server management tasks — with Windows Server 2012 R2.
- **Storage hardware and management cost savings of \$56,900 to \$276,900 per year.** The representative organization has and expects to continue to be able to replace retiring SAN systems, as well as avoid new SAN purchases by leveraging software-defined storage on Windows Server 2012 R2 with commodity hardware. Management costs, particularly from the reduction in SAN appliances, are also expected to significantly reduce.
- **Cloud integration management savings of \$312,000 per year.** The process of integration of cloud application interfaces for customer or mobile user access is much easier and quicker with the Azure Pack. However, this value is an estimate based on what organizations would have paid; most interviewed organizations found the barrier to most cloud integration too high before R2.
- **New and improved services leading to new marginal profit estimated at \$600,000 per year.** With cloud-integrated applications now more easily and quickly implemented with Windows Server 2012 R2, the representative organization is able to take advantage of new revenue opportunities, such as a new mobile sales application that helps with cross-selling and upselling, or a customer-facing eCommerce application that drives new revenue.
- **Additionally, for organizations upgrading to R2 from earlier versions, a previous Forrester TEI study estimated \$2,124,866 to \$2,343,834 per year** in additional benefits gained when upgrading to Windows Server 2012, enabled by new and improved features such as DirectAccess, data deduplication, BranchCache, VDI, Hyper-V Replica, and other management savings improvements.<sup>3</sup>

› **Costs.** The composite organization experienced the following risk-adjusted costs:

- **Implementation costs of \$1,120,000 for resources required for R2 upgrade planning, testing, and implementation.** Very little or no time at all was required for increased support or training.
- **Incremental management costs of \$135,200 per year.** Increases in IT-provided services, particularly related to storage and cloud integration, require some additional management time; however, note that this is more than offset by the annual management cost savings of \$402,220 summarized above.
- As the organization already had servers with Windows Server 2008 and 2012 on current volume licensing that have happened regardless of the upgrade to R2, no incremental software or hardware costs were included.
- **For organizations upgrading today to R2 from earlier versions, Forrester's previous Windows Server 2012 TEI study interviewed customers that upgraded from earlier versions of Windows Server, including 2003, as well as alternative server solutions.**<sup>4</sup> The summary of costs from that study is nearly \$984,500 for new hardware, additional implementation labor, and other upfront costs. After deployment, annual costs were estimated to be \$347,643 per year for ongoing software license costs.

## Disclosures

The reader should be aware of the following:

- › The study is commissioned by Microsoft and delivered by Forrester Consulting. It is not meant to be used as a competitive analysis.
- › Forrester makes no assumptions as to the potential ROI that other organizations will receive. Forrester strongly advises that readers use their own estimates within the framework provided in the report to determine the appropriateness of an investment in Microsoft Windows Server 2012 R2.
- › 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.
- › Microsoft provided the customer names for the interviews but did not participate in the interviews.

## TEI Framework And Methodology

### INTRODUCTION

From the information provided in the interviews, Forrester has constructed a Total Economic Impact™ (TEI) framework for those organizations considering implementing Microsoft Windows Server 2012 R2. The objective of the framework is to identify the cost, benefit, flexibility, and risk factors that affect the investment decision.

### APPROACH AND METHODOLOGY

Forrester took a multistep approach to evaluate the impact that Microsoft Windows Server 2012 R2 can have on an organization (see Figure 2). Specifically, we:

- › Interviewed Microsoft marketing and sales personnel, along with Forrester analysts, to gather data relative to Windows Server 2012 R2 and the marketplace for Windows Server 2012 R2.
- › Interviewed six organizations currently using Microsoft Windows Server 2012 R2 to obtain data with respect to costs, benefits, and risks.
- › Designed a composite organization based on characteristics of the interviewed organizations (see Appendix A).
- › Constructed a financial model representative of the interviews using the TEI methodology. The financial model is populated with the cost and benefit data obtained from the interviews as applied to the composite organization.
- › Risk-adjusted the financial model based on issues and concerns the organizations mentioned in interviews. Risk adjustment is a key part of the TEI methodology. While interviewed organizations provided cost and benefit estimates, some categories included a broad range of responses or had a number of outside forces that might have affected the results. For that reason, some cost and benefit totals have been risk-adjusted, and is detailed in each relevant section.

Forrester employed four fundamental elements of TEI in modeling Microsoft Windows Server 2012 R2's service: benefits, costs, flexibility, and risks.

Given the increasing sophistication that enterprises have regarding ROI analyses related to IT investments, Forrester's TEI methodology serves to provide a complete picture of the total economic impact of purchase decisions. Please see Appendix B for additional information on the TEI methodology.

**FIGURE 2**  
TEI Approach



Source: Forrester Research, Inc.

## Analysis

### COMPOSITE ORGANIZATION

For this study, Forrester conducted a total of six interviews with representatives from the following companies, which are Microsoft customers, Windows Server 2012 R2 early adopters, and had upgraded from Windows Server 2008 or 2012. The organizations are based in the US and Europe:

- › A global consumer and institutional financial services company based in the US.
- › The engineering school of a large US university.
- › A telecom firm focused in Central and Eastern Europe.
- › A midsize management consulting firm based in the US.
- › A nationwide US hosting and IT services firm.
- › A global facility management service provider.

Based on the interviews, Forrester constructed a TEI framework, a composite company, and an associated ROI analysis that illustrates the areas financially affected. The composite organization that Forrester synthesized from these results represents an organization with the following characteristics:

- › A global, US-based organization that uses Windows Server resources and applications running on Windows Server to support internal resources as well as web-based applications for consumers.
- › In the financial services industry; however, this study focuses on costs and benefits that can apply to an organization working in most any industry.
- › Annual revenues of \$10 billion, and an 8% profit margin.
- › 15,000 employees, with some Windows Server resources supporting a customer base significantly larger.
- › 350 Windows Server hosts.
- › 1,000 virtualized Windows Server instances.
- › 20 internal FTE focused on ongoing server management and monitoring.

After evaluating the new features of Windows Server 2012 R2 and System Center 2012 R2 and estimating that the upgrade would not require any new hardware, little training, and reasonable time and resource implementation expectations, the composite organization began deployment:

- › Deployment started in late 2013.
- › All Windows Servers were upgraded to 2012 R2 — from Windows Server 2008 and/or 2012.

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*“Our goal is to manage both cloud and internal resources or servers from a single pane of glass, leveraging VMM 2012. An important part of that strategy is to make sure everything is on 2012 R2, or at least as much of it as possible.”*

~VP, global IT, facility management service provider

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*“The value is in the increased agility: the ability to have a shorter response time to new requests, being able to have this dynamic elasticity and ‘just-in-time’ approach.”*

~System engineer, US university

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- › Volume licensing including Software Assurance was current; the R2 upgrade was planned for current servers on 2008 and/or 2012 with upgrade rights to 2012 R2 under Software Assurance, so no new software or hardware was required.
  - Note that highlights summarizing the costs and benefits of Windows Server 2012 are referencing an earlier TEI study, based on interviews with and survey responses from a different set of customers.<sup>5</sup>
- › Hyper-V was implemented as the standard hypervisor for all virtualized server instances.
- › System Center 2012 R2 was deployed and made the standard management platform with Virtual Machine Manager (VMM) as the primary console for all Windows Server virtualized instances.

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*“I can get rid of 30 physical servers that are dying; they are old. Now we can go to three virtual servers, and replicate them.”*

~President, management consulting firm

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## INTERVIEW HIGHLIGHTS

All the interviewed organizations participated in Microsoft’s Windows Server 2012 R2 early adopter program. While not every organization has taken advantage of all the new features available in R2, all have experienced positive value from the upgrade, and plan to continue to implement R2 to new server workloads and take advantage of additional features.

For this study, a representative organization has been developed based on a composite of interview participants’ feedback and data. The representative organization will help summarize costs and benefits, and illustrate business process improvements and costs savings opportunities.

### *Situation*

The representative organization was already a Windows Server customer, using it for some workloads since Windows Server 2000 and 2003 but not really focusing on business-critical workloads until Windows Server 2008 and 2012. Around the time Windows Server 2012 R2 was made available, the organization saw some business and cost-savings opportunities:

- › The organization wanted to standardize on one hypervisor platform; it was using Hyper-V for only a small subset of virtualized server instances, and was licensing additional software. As one organization put it, this duplicated some management tasks and required significant additional licensing costs.
- › Server patching and maintenance tasks took a long time; while Windows Server 2012 R2 provided some significant benefits from earlier versions, server migration tasks still took a lot of time.
- › Storage costs were rising, and were expected to rise even faster in the near future. One organization highlighted its significant growth expectations and that meeting storage scale with additional SAN appliances would be expensive.
- › The organization wanted to provide services to customers but its current options, such as spending extra time developing custom integration code to connect to Azure or other cloud services, were limited and not cost-effective.

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*“The ease of handling and reliability of our software defined storage has been great — no hiccups!”*

~CTO, hosted services provider

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### Solution

The composite organization upgraded its Windows Server 2008 and 2012 infrastructure to Windows Server 2012 R2 with System Center 2012 R2. It specifically focused on improved networking and storage features, such as software defined storage, guest clustering, and the Azure Pack to take advantage of these new and improved features to enable benefits and cost savings.

### Results

The interviews highlighted the following benefits, as described for the representative organization:

- › **With R2, Hyper-V meets or exceeds hypervisor requirements.** Since Hyper-V is included in the price of Windows Server 2012 R2, which the organization was already licensing, it was able to standardize on one hypervisor platform and eliminate software licensing costs for redundant solutions.
- › **Built-in virtualization with Cluster-Aware Updating and Live Migration** allows customers to automate patching, vastly reducing the need for manual interaction by speeding up maintenance of servers.
- › **Software-defined storage allows the organization to use commodity servers as storage resources,** meaning it can save considerably by avoiding SAN hardware costs by making use of low-cost, high-volume hardware, often called “JBODs,” or “just a bunch of disks.”
- › **Guest clustering means organizations can deliver new and improved solutions to customers,** (particularly those that provide hosted services) by moving management tools to the software layer that can be exposed to customers and provided as self-service tools, such as proactive health monitoring, application mobility, protection from host failure, and virtual machine mobility.

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*“We were spending a quarter of million dollars a year on storage and now we don’t have to. We are now using cheaper storage with higher redundancy.”*

~President, management consulting firm

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## BENEFITS

The composite organization experienced a number of quantified benefits in this case study based on the representative organization's upgrade to Windows Server 2012 R2:

- › Reduced and avoided hypervisor solution costs.
- › Reduced management costs.
- › Reduced and avoided storage solution costs.
- › Incremental revenue generated from new and improved services.

### + Reduced And Avoided Solution Licensing Costs

System Center and Hyper-V have improved significantly with R2, providing greater scalability and performance. The organization saw that with these improvements; it now had some redundant virtualization and management solutions and deemed it well worth consolidating these solutions on Windows Server 2012 R2 and System Center 2012 R2, even considering the investment costs required for the upgrade.

As Hyper-V is included with the license cost of Windows Server, the organization opted to phase out any alternative virtualization leading to significant avoided-cost savings. The organization expects to save \$1 million in the first year avoiding license renewals, and \$575,000 per year in ongoing maintenance costs, as shown in Table 1.

*“We will be able to eliminate almost \$250,000 in annual software licensing costs by leveraging features and services available in Windows Server 2012 R2.”*

~VP, global IT, facility management service provider

**TABLE 1**  
**Reduced And Avoided License Cost Savings**

Ref.	Metric	Calculation	Year 1	Year 2	Year 3
A1	Previous solution licenses		500		
A2	Previous solution annual support and maintenance fees (per license)		\$750	\$750	\$750
A3	Other previous solution license cost savings		\$700,000	\$200,000	\$200,000
<b>Atr</b>	<b>License cost savings</b>	$A1 * A2 + A3$	<b>\$1,075,000</b>	<b>\$575,000</b>	<b>\$575,000</b>

Source: Forrester Research, Inc.

### + Management Cost Savings

Nearly every enhancement in R2 either directly or indirectly helps streamline and speed up common server management tasks. Before Windows Server 2012 R2, the representative organization estimates 20 employees focused at least some of their time on server management. With the upgrade to R2, those tasks now require about 35% less time and effort, freeing those IT managers for other important tasks.

With Live Migration, upgrading server hosts or virtualized servers in clustered environments is easier and much quicker. And software-defined networking and software-defined storage are both geared to help more easily manage a wide variety of hardware and software resources. Specific tasks and processes that have been improved with Windows Server 2012 R2 include:

- › Hyper-V host patching and VM mobility improved with Live Migration enhancements,

- › Enriched server, storage, and network resource provisioning with System Center 2012 R2,
- › On-demand services such as IaaS with Azure Services integration,
- › Replication of virtual machines to provide disaster recovery options that leverage Hyper-V Replica,
- › Multi-server management and automation with Windows PowerShell.

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*“It’s quite a bit faster now to manage our servers, 30% at least.”*

~IT manager, European telecom

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**TABLE 2**  
**Management Cost Savings**

Ref.	Metric	Calculation	Year 1	Year 2	Year 3
B1	FTE focused on server management		20		
B2	Percentage of time spent on Windows Server 2012 R2-related tasks		67%		
B3	FTE server management resource hourly rate		\$65		
B4	Improvement with Windows Server 2012 R2		35%		
B5	Percentage of time recovered for work tasks		75%		
Bt	Management cost savings	$B1 * B2 * B3 * 2080 * B4 * B5$	\$473,200	\$473,200	\$473,200
	Risk adjustment	↓ 15%			
<b>Btr</b>	<b>Management cost savings (risk-adjusted)</b>		<b>\$402,220</b>	<b>\$402,220</b>	<b>\$402,220</b>

Source: Forrester Research, Inc.

The representative organization estimated that for all Windows Server related tasks, IT resources were able to recover 35% of their time to focus on other new or previously tabled important priorities. Overall, the team of 20 server management resources saves 35% of their time, adding up to more than \$470,000 in productivity each year as shown in Table 2.

As resource time spent on specific tasks is inexact, this benefit has been risk-adjusted by 15% as some time savings may have been overestimated. The risk-adjusted benefit shown in Table 2 is more than \$400,000 per year. See the section on Risks for more detail about risk adjustment as part of the TEI framework.

### ★ Storage Cost Savings

With software-defined storage, the organization was able to use its standard server and storage hardware (already owned or repurposed) in a cluster of commodity hardware servers with large, redundant storage (sometimes called JBODs, or “just a bunch of disks”). The organization now has the opportunity to retire SAN appliances for tier two applications, avoiding the purchase of new SAN appliances in favor of JBODs, and has already started on a few.

One interviewed organization highlighted the benefit of improved management of storage and data: “Software-defined storage shows a lot of promise . . . to change how we’re architecting the platform to add that additional level of fault tolerance. It’s risk management and mitigation as well as performance.” Also, commodity hardware is easier to manage,

saving some additional costs by leveraging familiar Windows Servers that can be managed with the same System Center tools, and commodity hardware provides more replication options, leading to reduced downtime. One interviewee confirms: “We are now using cheaper storage with higher redundancy.”

Overall, for tier two applications, the organization expects to retire two SAN appliances in the first and second years, and one in Year 3. In the second and third year, the organization also expects to avoid the purchase of two new SAN appliances in each year. In addition to the hardware, SAN appliances require more and more specialized management, leading to greater savings based on the number of cumulative retired and avoided SAN appliances. Total savings add up to \$56,900 in the first year ramping up to \$276,900 in Year 3, as shown in Table 3.

**TABLE 3**  
**Storage Cost Savings**

Ref.	Metric	Calculation	Year 1	Year 2	Year 3
C1	Total estimated hours per week on storage-related management tasks		20	20	20
C2	IT resource hourly rate		\$65		
C3	Reduction in storage management time requirements with Veracode		25%		
C4	Current SANs in use		10		
C5	Tier two SANs to be retired		2	2	1
C6	Planned but avoided tier two SAN purchases		0	1	2
C7	Cost per new SAN purchase		\$50,000		
C8	Cost to manage each SAN appliance		\$20,000		
<b>Ctr</b>	<b>Storage cost savings</b>	$C1 \cdot C2 \cdot C3 \cdot 52 + C6 \cdot C7 + (C5 + C6) \cdot C8$	<b>\$56,900</b>	<b>\$166,900</b>	<b>\$276,900</b>

Source: Forrester Research, Inc.

### ★ Easier Integration With Cloud And Other Systems Cost Savings

With the Windows Azure Pack in particular, the organization is able to more efficiently integrate its on-premises virtualized servers with other private cloud solutions. Windows Azure Pack integrates with System Center and Windows Server to help provide a self-service portal for managing services such as websites, virtual machines, and service bus; a portal for administrators to manage resource clouds; scalable web hosting; and more.

Given that the organization only has started to integrate a few applications and data sources, not a lot of time is spent on integration (relative to other server management tasks). However, the organization estimates that it has saved a considerable amount of the time it does spend on integration management and customization — \$312,000 per year in IT costs, as shown in Table 4. Since integration time is a broad estimate, this cost savings has been risk-adjusted by 20%, for a risk-adjusted cost savings of about \$250,000 per year. See the

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*“I could not live without live migration. The speed is very, very useful.”*

~Systems engineer, US university

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section on Risks for more detail about risk adjustment as part of the TEI framework.

Note that while this section focuses on cost savings, the next section highlights the improved services — revenue opportunities — available with Windows Server 2012 R2 and System Center 2012 R2 and the Windows Azure Pack.

**TABLE 4**  
**Integration And Management Savings With Cloud Solutions**

Ref.	Metric	Calculation	Year 1	Year 2	Year 3
D1	Hours per quarter spent on system integration		2,400		
D2	IT resource hourly rate		\$65		
D3	Improvement with Windows Azure Pack and R2		50%		
Dt	Integration with cloud and other systems benefits	$D1 * D2 * D3 * 4$	\$312,000	\$312,000	\$312,000
	Risk adjustment	↓ 20%			
<b>Dtr</b>	<b>Integration with cloud and other systems benefits (risk-adjusted)</b>		<b>\$249,600</b>	<b>\$249,600</b>	<b>\$249,600</b>

Source: Forrester Research, Inc.

### ★ Service Improvements

With the upgrade to R2, the organization has been able to improve some services to both internal and external audiences. The time savings and storage improvements in R2 are obviously a large benefit for service providers, hosters, and other organizations that deal with an extremely large-infrastructure scale.

But all organizations can take advantage of new business opportunities with Windows Server 2012 R2. For example, one organization already expects to be able to reduce costs of current services due to features such as guest clustering, network-attached storage (NAS), and Hyper-V Replica.

The organization expects to be able to improve customer- and sales-facing server applications that, with improved performance and reliability, can lead to additional sales. Also, the organization is considering expanding or creating hybrid solutions connecting internal resources to applications deployed to Azure. With faster development and integration, the organization expects the earlier time-to-market of these applications to provide some additional revenue. One interviewed organization is planning to “host services for many of our partners and customers,” leveraging Azure and System Center 2012 R2 and leading to significant additional revenue.

For the representative organization, new annual revenue from these improved and new services is estimated to total \$10 million (one-tenth of one percent of the total organization revenue); at an 8% profit margin that means \$800,000 of added profit per year. However, since revenue and profit are influenced by a number of

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*“I am looking to leverage the Cloud OS and the whole System Center 2012 R2 Suite with Azure Infrastructure-as-a-Service to create a hybrid cloud environment and a multitenant environment in Azure so that we can host services for many of our partners and customers.”*

~VP, global IT, facility management service provider

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drivers, this benefit has been risk-adjusted by 25% to better estimate the revenue and profit impact enabled by Windows Server 2012 R2. The risk-adjusted profit is \$600,000 per year, as shown in Table 5. See the section on Risks for more detail about risk adjustment as part of the TEI framework.

**TABLE 5**  
**Service Improvements**

Ref.	Metric	Calculation	Year 1	Year 2	Year 3
E1	Improved revenue with Windows Server 2012 R2		\$10,000,000	\$10,000,000	\$10,000,000
E2	Profit margin		8%		
Et	Service improvement benefits	E1 * E2	\$800,000	\$800,000	\$800,000
	Risk adjustment	↓ 25%			
<b>Etr</b>	<b>Service improvement benefits (risk-adjusted)</b>		<b>\$600,000</b>	<b>\$600,000</b>	<b>\$600,000</b>

Source: Forrester Research, Inc.

While the representative organization is not a hosted services provider and this is not included in this analysis, it is worth mentioning that this benefit may be even higher for organizations that host application and platform services. For example, faster patching (and thus less, if any, downtime) means greater service stability and reliability, reducing customer churn and even bringing in new customers. With new, flexible virtual disks options, such as shared VHDX, solutions such as guest clustering can be provided without the need to expose the underlying physical storage.

### ★ Benefit Summary From Windows Server 2012 TEI

In addition to this TEI focused on the upgrade to R2, Forrester developed an earlier TEI focused on the costs and benefits of deploying Windows Server 2012, primarily from earlier versions or non-Microsoft server alternatives. The findings from that study for the most part complement the findings in this study, though that study was based on a different set of customer interviews. Benefits of Windows Server 2012 as outlined in that study add up to \$2.1 million to \$2.4 million per year and include:

- › **Improved storage efficiency and reliability with new storage scenarios saving \$45,000 to \$243,000 per year.** With the rapid growth of storage within the data center, organizations found Windows 2012 provided greater data deduplication and storage management with features such as the active-active file server clusters for transparent failover, reducing storage needs by an average of 33%.
- › **Increased productivity — server administration benefits of \$541,000 per year.** Windows Server 2012 also provided many organizations with the opportunity to increase their virtualization and virtual desktop infrastructure (VDI) footprint, allowing staff to do more with the same amount of resources.
- › **Reduced IT infrastructure spend of \$922,000 per year.** Driving down infrastructure costs was a key benefit for many of the interviewed organizations. Windows Server 2012 improved the efficiency of spend on infrastructure, cooling, software, power, and hardware through the ability of organizations to reduce physical servers in a virtualized environment.
- › **Greater end user productivity benefits of \$203,000 per year.** BranchCache and DirectAccess within Windows Server 2012 allowed organizations to derive additional savings by providing added levels of support to selected end users.
- › **Improved application and web development productivity of \$310,000 per year.** For organizations that used Windows Server 2012 as part of their web applications, these organizations saw increases in developer productivity.

› **Other benefits adding up to \$101,000 to \$136,000 per year.**

For more information, please refer to the earlier TEI study which covers the benefits of upgrading or migrating to Windows Server 2012.<sup>6</sup>

### Total Benefits

Table 6 shows the total of all benefits of upgrading to Windows Server 2012 R2 across the five areas listed above (not counting the additional benefits found in the Windows Server 2012 TEI study outlined in the previous section), as well as present values (PVs) discounted at 10%. Over three years, the composite organization expects risk-adjusted total benefits of R2 to be a PV of more than \$5 million.

**TABLE 6**  
**Total Benefits (Risk-Adjusted)**

Ref.	Benefit	Initial	Year 1	Year 2	Year 3	Total	Present Value
Atr	License cost savings	\$0	\$1,075,000	\$575,000	\$575,000	\$2,225,000	\$1,884,485
Btr	Management cost savings	\$0	\$402,220	\$402,220	\$402,220	\$1,206,660	\$1,000,262
Ctr	Storage cost savings	\$0	\$141,960	\$221,680	\$221,680	\$585,320	\$478,813
Dtr	Integration with cloud and other systems benefits	\$0	\$249,600	\$249,600	\$249,600	\$748,800	\$620,718
Etr	Service improvement benefits	\$0	\$562,500	\$562,500	\$562,500	\$1,687,500	\$1,398,854
	<b>Total benefits (risk-adjusted)</b>	<b>\$0</b>	<b>\$2,431,280</b>	<b>\$2,011,000</b>	<b>\$2,011,000</b>	<b>\$6,453,280</b>	<b>\$5,383,132</b>

Source: Forrester Research, Inc.

## COSTS

Since the composite organization already owned the required licenses and servers needed to upgrade to R2, the only cost considered is the time and effort required to upgrade to Windows Server 2012 R2 and System Center 2012 R2.

### Implementation Costs

While the organization expects no new software or hardware costs, it did expect and did need to provide resources and money to properly deploy the Windows Server 2012 R2 software upgrades, as well as plan for and implement IT management process changes.

The organization deployed its full core server management team of eight to the task, working around half-time for 15 weeks on R2 planning, testing, and implementation. Between one and two consulting resources were also brought in to help. As shown in Table 7, the total implementation costs add up to a little more than \$1.1 million.

**TABLE 7**  
**Implementation Costs**

Ref.	Metric	Calculation	Initial	Year 1	Year 2	Year 3
F1	Estimated total weeks of implementation		24			
F2	People focused on server management		20			
F3	Average FTE utilization on implementation tasks		67%			
F4	Organization FTE hourly rate		\$65			
F5	Consulting/outsourced FTE (average per week during implementation)		3.0			
F6	Consulting/outsourced FTE hourly rate		\$100			
F7	Training costs		\$0			
F8	Other implementation costs		\$0			
Ftr	Implementation costs	$F1 * 40 * (F2 * F3 * F4 + F5 * F6) + F7 + F8$	\$1,120,000			

Source: Forrester Research, Inc.

### Annual Resource Costs For Server Management

While Software Assurance costs are considered part of the previous Windows Server implementation (and thus not included here as a net-new cost associated with the implementation of R2), new features in R2 require new or more intensive management tasks, while some tasks are now shorter than before. Ongoing costs that were the same as before the upgrade to R2 are not considered here (for example, there was not a significant change in user help desk calls, so it is not included in this model). Changed and new ongoing costs related to the upgrade to R2 total \$135,200 per year as shown in Table 8.

Other costs associated with server management and storage management, however, were reduced and are outlined in the Benefits section and detailed in Table 2. The net change adding up all management costs is a cost savings of \$267,020 per year (the risk-adjusted total from Table 8 subtracted from the total benefit from Table 2) and is included in the net benefits highlighted in the Financial Summary section, Table 11.



**TABLE 8**  
**Ongoing Server And Storage Management Costs**

Ref.	Metric	Calculation	Year 1	Year 2	Year 3
G1	Organization FTE focused on server management		20		
G2	Hours per week per FTE required to manage new R2 features		2		
G3	Organization FTE hourly rate		\$65		
G4	Other hardware or software costs		\$0	\$0	\$0
G5	Other management costs		\$0	\$0	\$0
Gt	New ongoing management costs	$G1 \cdot G2 \cdot 52^*$ $G3 + G4 + G5$	\$135,200	\$135,200	\$135,200

Source: Forrester Research, Inc.

### ➤ Software And Hardware Licensing And Maintenance Fees

For this study, it is assumed that all licenses are already purchased as part of the organization's Windows Server 2012 and System Center 2012 volume licensing agreements. No additional software was required, even for non-Hyper-V virtualized resources (since these still included Windows Server instances).

"We didn't buy hardware specifically for this investment, because we're just laying it into our existing hardware and growth," said the president of one of the interview participants, a hosted services provider.

No additional hardware was required either, since no hardware improvements are required for an upgrade from Windows Server 2012 to R2.

By the same token, no incremental annual costs are included in this model — all annual Software Assurance licensing and annual hardware maintenance costs are already planned as part of the previous Windows Server 2012 deployment (including any volume licensing renewals).

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*"We didn't buy hardware specifically for this investment, because we're just laying it into our existing hardware and growth."*

~President, hosted services provider

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### ➤ Cost Summary From Windows Server 2012 TEI

The costs outlined above focus on the incremental costs required for the upgrade to R2, Forrester developed an earlier TEI focused on the costs and benefits of deploying Windows Server 2012, primarily from earlier versions or non-Microsoft server alternatives, which complement the costs outlined above — for the most part (bear in mind that that study was based on a different set of customer interviews). Costs of Windows Server 2012 as outlined in that study add up to \$985,000 in initial costs and \$348,000 per year in ongoing annual costs, and include:

- Windows Server 2012 annual license fees, including Software Assurance, add up to \$1,033,000 over three years.
- Additional server and client software fees of \$35,000 at implementation, including System Center, and Windows 7 Enterprise licenses for BranchCache implementation.

- › Hardware costs of \$140,000 at implementation to replace and upgrade older server hardware for Windows Server 2012 deployment.
- › Internal labor costs for implementation, including time the organization spent on the planning, testing, implementation, and post-implementation testing, was \$525,000, plus \$150,000 for outsourced and consulting resources.

For more information, review the TEI study detailing the deployment of or migration to Windows Server 2012 which covers these costs in detail.<sup>7</sup>

### Total Costs

Table 9 shows the total of all costs as well as associated present values, discounted at 10%. Over three years, the composite organization expects total costs to total a net present value of a little more than \$1.4 million.

**TABLE 9**  
**Total Costs (Risk-Adjusted)**

Ref.	Cost	Initial	Year 1	Year 2	Year 3	Total	Present Value
Ftr	Implementation costs	(\$1,120,000)	\$0	\$0	\$0	(\$1,120,000)	(\$1,120,000)
Gtr	New ongoing management costs	\$0	(\$135,200)	(\$135,200)	(\$135,200)	(\$405,600)	(\$336,222)
	<b>Total costs (risk-adjusted)</b>	<b>(\$1,120,000)</b>	<b>(\$135,200)</b>	<b>(\$135,200)</b>	<b>(\$135,200)</b>	<b>(\$1,525,600)</b>	<b>(\$1,456,222)</b>

Source: Forrester Research, Inc.

## FLEXIBILITY

Flexibility, as defined by TEI, represents an investment in additional capacity or capability that could be turned into business benefit for some future additional investment. The additional capabilities are made available — or with the “option” of further incremental investment — based on the organization making the current investment outlined in the Costs section. This provides an organization with the “right” or the ability to engage in future initiatives but not the obligation to do so. There are multiple scenarios in which a customer might choose to implement Windows Server 2012 R2 and later realize additional uses and business opportunities. Flexibility would also be quantified when evaluated as part of a specific project (described in more detail in Appendix B).

For the representative organization, Windows Server 2012 R2 and System Center 2012 R2 help provide a reliable and scalable server platform where management tasks can be completed more quickly, storage is easier to manage, cloud integration is better, and new features supporting more BYOD (bring your own device) are available. All these help the organization deliver better services to more internal and customer groups, which means more people that need access to tools and applications (such as a sales application available while on the road, or a customer-facing web application to help manage accounts, conduct transactions, review inventory, etc.) can get the right information when they need it, and are able to complete tasks more efficiently and correctly.

For example, if the organization has 1,500 employees in information-worker roles, and 20% of those people spend a significant amount of their time using resources that have been deployed on Windows Server 2012 R2 (and improved with R2), that is 300 employees that could potentially benefit from R2. If they spend 6 hours per month on specific tasks that touch R2 resources (such as using a sales tool that has been improved with the upgrade to R2), the task time is improved by 25%, and three-fourths of that recovered time can be used for other work-related tasks, that adds up to about \$400,000 per year.

Another key area of flexibility involves expanding service offerings in the future. While the representative organization has already made some improvements and created new service offerings, as detailed in Table 5, they recognize this as just a start. The organization hopes to leverage Hyper-V Replica to improve disaster recovery systems, improve overall quality of service, leverage storage spaces in a greater way, and move more workloads to be managed with software-defined networking. If these improvements are made some time in the future and lead to another one-tenth of one percent in benefits, that would mean an additional \$600,000 of annual revenue — in addition to the internal cost savings from improved management and reduced risk.

## RISKS

Forrester defines two types of risk associated with this analysis: “implementation risk” and “impact risk.” “Implementation risk” is the risk that a proposed investment in Windows Server 2012 R2 may deviate from the original or expected requirements, resulting in higher costs than anticipated. “Impact risk” refers to the risk that the business or technology needs of the organization may not be met by the investment in Windows Server 2012 R2, resulting in lower overall total benefits. The greater the uncertainty, the wider the potential range of outcomes for cost and benefit estimates.

**TABLE 10**  
**Benefit And Cost Risk Adjustments**

<b>Benefits</b>	<b>Adjustment</b>
Management cost savings	↓ 15%
Integration and management savings with cloud solutions	↓ 20%
Service improvement benefits	↓ 25%
<b>Costs</b>	<b>Adjustment</b>
None	

Source: Forrester Research, Inc.

Quantitatively capturing implementation risk and impact risk by directly adjusting the financial estimates results provides more meaningful and accurate estimates and a more accurate projection of the ROI. In general, risks affect costs by raising the original estimates, and they affect benefits by reducing the original estimates. The risk-adjusted numbers should be taken as “realistic” expectations since they represent the expected values considering risk.

The following impact risks that affect benefits are identified as part of the analysis:

- › Measuring management resource time spent on specific tasks is inexact, and self-reporting may be underestimated.
- › Cloud integration benefits are enabled by more than just the Azure Pack with Windows Server and System Center 2012 R2.
- › Revenue and profit are influenced by a number of drivers — not just Windows Server 2012 R2.

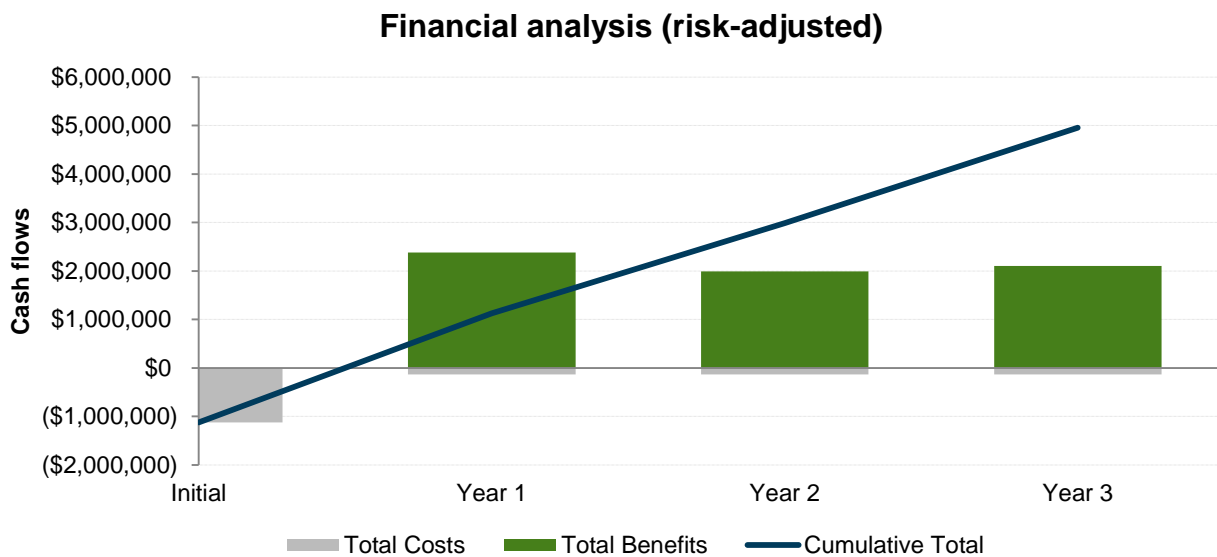
Table 10 shows the values used to adjust for risk and uncertainty in the cost and benefit estimates. Readers are urged to apply their own risk ranges based on their own degree of confidence in the cost and benefit estimates.

## Financial Summary

The financial results calculated in the Benefits and Costs sections can be used to determine the ROI and NPV for the organization's investment in Windows Server 2012 R2. Note that this study focuses on the incremental costs and benefits of an upgrade to R2; for a full analysis of Windows Server 2012 review Forrester's "The Total Economic Impact of Windows Server 2012" published in 2012.<sup>8</sup>

Table 11 and Figure 3 below show the risk-adjusted ROI and NPV values. These are determined by applying the risk-adjustment values from Table 10 in the Risks section to the unadjusted results in each relevant cost and benefit section.

**FIGURE 3**  
Cash Flow Chart (Risk-Adjusted)



Source: Forrester Research, Inc.

**TABLE 11**  
Cash Flow: Risk-Adjusted

	Initial	Year 1	Year 2	Year 3	Total	Present value
Costs	(\$1,120,000)	(\$135,200)	(\$135,200)	(\$135,200)	(\$1,525,600)	(\$1,456,222)
Benefits	\$0	\$2,383,720	\$1,993,720	\$2,103,720	\$6,481,160	\$5,395,277
Net benefits	<b>(\$1,120,000)</b>	<b>\$2,248,520</b>	<b>\$1,858,520</b>	<b>\$1,968,520</b>	<b>\$4,955,560</b>	<b>\$3,939,054</b>
ROI						<b>270%</b>
Payback period						<b>6.0</b>

Source: Forrester Research, Inc.

## FINANCIAL SUMMARY — ESTIMATES OF COSTS AND BENEFITS OF COMBINED RESULTS FROM WINDOWS SERVER 2012 R2 AND WINDOWS SERVER 2012 TEI STUDIES

By combining the summary tables from this TEI focused on the incremental upgrade to Windows Server 2012 R2 with the earlier TEI of Windows Server 2012, Table 12 shows the combined costs, benefits, NPV, ROI, and payback metrics. Note that while both studies are modeled on representative organizations of 15,000 employees, the studies interviewed and surveyed different organizations, and there are differences in the representative organizations based on the differences in the organizations interviewed for each.

The following metrics are provided as a reference for the kinds of costs and benefits an organization could expect after upgrading to Windows Server 2012 R2 from an earlier version of Windows Server or an alternative server solution. The net present value (NPV) of upgrading or migrating to Windows Server 2012 R2 is estimated at about \$7.6 million, with an ROI of 229%, as shown in Table 12.

This study includes the costs and benefits of Windows Server 2012 R2, as summarized in the Financial Summary above. For more details on the costs and benefits of migrating or upgrading to Windows Server 2012, review that earlier TEI study.<sup>9</sup>

**TABLE 12**

**Cash Flow: Risk-Adjusted Summary Of Combined Estimated Results From This Windows Server 2012 R2 TEI And The Previous Windows Server 2012 TEI**

	Initial	Year 1	Year 2	Year 3	Total	Present value
Estimated combined costs	(\$2,104,500)	(\$482,843)	(\$482,843)	(\$482,843)	(\$3,553,029)	(\$3,305,259)
Estimated combined benefits	\$0	\$4,727,554	\$4,118,586	\$4,225,390	\$13,071,530	\$10,876,165
<b>Estimated combined total</b>	<b>(\$2,104,500)</b>	<b>\$4,244,711</b>	<b>\$3,635,743</b>	<b>\$3,742,547</b>	<b>\$9,518,502</b>	<b>\$7,570,906</b>
<b>Estimated combined ROI</b>						<b>229%</b>
<b>Estimated combined payback (months)</b>						<b>6.0</b>

Source: Forrester Research, Inc.

## Windows Server 2012 R2: Overview

According to Microsoft, Windows Server 2012 R2 combines Microsoft's knowledge and experiences with today's trends and technology innovations to deliver a modern platform of products and services that helps organizations transform their current server environment into highly elastic, scalable, and reliable cloud infrastructure. It provides a best-in-class server experience that cost-effectively cloud-optimizes your business. It includes the following types of new and enhanced features:

**Enterprise-class data center and cloud platform:** Simply implementing a virtualized solution within your infrastructure is not enough to provide the agility today's IT challenges require. Windows Server 2012 R2 changes the virtualization equation by enabling you to deploy and manage a multitenant cloud infrastructure within a flexible IT environment that adapts to your changing business needs. New and enhanced features in Windows Server 2012 R2 empower you to efficiently utilize the capacity of your data center, while delivering best-in-class performance for your Microsoft workloads. Access to corporate resources such as workloads, storage, and networks help increase the agility of your business while protecting corporate information. Offering a proven, enterprise-class cloud and data center platform, Windows Server 2012 R2 can easily scale to continuously run the largest workloads with support for up to 64 processors and 1 terabyte of memory for Hyper-V guests, and VHDX virtual hard disks up to 64 terabytes. In addition, powerful availability features protect against service outages. And with automated protection and recovery for cost-effective business continuity on-premises and across clouds, you can improve your workload SLAs while reducing downtime risks. To help you protect your investments in existing cross-platform technologies, Windows Server 2012 R2 also offers expanded support for a heterogeneous data center, including rich Linux support.

**Simple and cost-effective:** Windows Server 2012 R2 enables you to blend your on-premises solutions with the cloud without having to re-engineer infrastructure, systems management, or applications.

With Windows Server 2012 R2, you can achieve enterprise-class storage for a wide range of workloads at a fraction of the cost of standalone storage solutions. Scale-out file-based storage clusters, virtual storage pooling, and automatic tiering deliver high-performance storage and availability coupled with efficient capacity utilization using industry-standard hardware.

In addition, features such as increased virtual machine density and improved virtual machine performance help you grow your capacity at a lower cost than premium-priced converged infrastructure solutions. And with Hyper-V Network Virtualization, the Hyper-V Extensible Switch, and a multi-tenant edge gateway built-in, Windows Server 2012 R2 offers a seamless and cost-effective software-defined networking solution in-box.

**Application focused:** Windows Server 2012 R2 enables you to build and deploy applications in your data center that utilize higher-level, cloud-based application services and APIs that are compatible with service provider clouds and Windows Azure. This functionality provides improved application portability between on-premises, public, and partner hosted clouds, increasing the flexibility and elasticity of your IT services.

Windows Server 2012 R2 also provides frameworks, services, and tools to increase scalability and elasticity for multi-tenant aware applications and websites. Features such as NUMA-aware scalability, centralized SSL certificate support, and application initialization help improve site density, site scalability, and performance.

The best platform for the .NET framework, Windows Server 2012 R2 also offers enhanced support for open frameworks, open source applications, and various development languages.

**User-centric:** Windows Server 2012 R2 empowers end users by helping provide them access to information and data regardless of the infrastructure, network, device, or application. Your IT staff can provide consistent access to corporate resources by managing and federating user identities and credentials across the organization and into the cloud, while providing secure, always-available access to your corporate network. Windows Server 2012 R2 also makes it easier to deploy a virtual desktop infrastructure (VDI) and lowers costs by supporting a range of storage options and storage deduplication for VDI.

In addition, Windows Server 2012 R2 helps you better protect information and manage risk by validating user identities, verifying their devices, and taking advantage of data classification.

## Appendix A: Composite Organization Description

For this TEI study, Forrester has created a composite organization to illustrate the quantifiable benefits and costs of implementing Windows Server 2012 R2. The composite company is intended to represent an enterprise organization of 15,000 employees and is based on characteristics of the following interview participants:

- › A global consumer and institutional financial services company based in the US.
- › The engineering school of a large US university.
- › A telecom firm focused in Central and Eastern Europe.
- › A midsize management consulting firm based in the US.
- › A nationwide US hosting and IT services firm.
- › A global facility management service provider.

The composite organization that Forrester synthesized from these interview participants represents an organization with the following characteristics:

- › A global, US based organization that uses Windows Server resources and applications running on Windows Server 2012 R2 to support internal resources as well as web-based applications for consumers.
- › In the financial services industry; however this study focuses on costs and benefits that can apply to an organization working in most any industry.
- › Annual revenues of \$10 billion, and an 8% profit margin.
- › 15,000 employees, with some Windows Server resources supporting a customer base significantly larger.
- › 350 Windows Server hosts.
- › 1,000 virtualized Windows Server instances.
- › 20 internal FTE focused on ongoing server management and monitoring. In addition, a one-half FTE consultant is also included on the team.
- › 1,500 information workers.

After evaluating the new features of Windows Server 2012 R2 and System Center 2012 R2 and estimating that the upgrade would not require any new hardware, little training, and reasonable time and resource implementation expectations, the composite organization began deployment:

- › Deployment started in late 2013.
- › All Windows Servers were upgraded to 2012 R2 — from Windows Server 2008 and/or 2012.
- › Volume licensing was current; the R2 upgrade was planned for all current servers on 2008 and/or 2012, so no new software or hardware was required.
- › Hyper-V was implemented as the standard hypervisor for all virtualized server instances.
- › System Center 2012 R2 was deployed and made the standard management platform and console for all Windows Server instances.

In purchasing Windows Server 2012 R2, the composite company has the following objectives:



- › Reduce costs through eliminating redundant licenses and being more efficient in server management tasks.
- › Further improve the costs and management of storage devices attached to Windows Server 2012 R2 servers.
- › Improve revenue by leveraging new features included in R2 that enable delivery of new or improved services to customers and partners.

## FRAMEWORK ASSUMPTIONS

Table 13 provides the model assumptions that Forrester used in this analysis.

The discount rate used in the PV and NPV calculations is 10% and time horizon used for the financial modeling is 3 years. Organizations typically use discount rates between 8% and 16% based on their current environment. Readers are urged to consult with their respective company's finance department to determine the most appropriate discount rate to use within their own organizations.

**TABLE 13**  
**Model Assumptions**

Ref.	Metric	Calculation	Value
C1	Hours per week		40
C2	Weeks per year		52
C3	Hours per year (M-F, 9-5)		2,080
C4	IT employee hourly rate		\$65
C5	Information worker employee hourly rate		\$100

Source: Forrester Research, Inc.

## Appendix B: 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 four components to evaluate investment value: benefits, costs, flexibility, and risks.

### 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 form 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.

### 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. However, having the ability to capture that benefit has a PV that can be estimated. The flexibility component of TEI captures that value.

### RISKS

Risks measure the uncertainty of benefit and cost estimates contained within the investment. Uncertainty is measured in two ways: 1) the likelihood that the cost and benefit estimates will meet the original projections, and 2) the likelihood that the estimates will be measured and tracked over time. TEI risk factors are based on a probability density function known as "triangular distribution" to the values entered. At a minimum, three values are calculated to estimate the risk factor around each cost and benefit.

## Appendix C: Glossary

**Discount rate:** The interest rate used in cash flow analysis to take into account the time value of money. Companies set their own 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 respective organizations 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 NPV of cash flows.

**Payback period:** The breakeven point for an investment. This is 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 Framework Assumptions section) at the end of the year. PV calculations are calculated for each total cost and benefit estimate. NPV calculations are not calculated until the summary tables are the sum of the initial investment and the discounted cash flows in each year.

Sums and present value calculations the Total Benefits, Total Costs, and Cash Flow tables may not exactly add up, as some rounding may occur.

TABLE [EXAMPLE]  
Example Table

Ref.	Metric	Calculation	Year 1	Year 2	Year 3

Source: Forrester Research, Inc.

## Appendix D: Supplemental Material

### *Related Forrester Research*

“The Total Economic Impact Of Windows Server 2012,” Forrester Consulting, November 2012

## Appendix E: Endnotes

<sup>1</sup> Source: Microsoft Server and Cloud Platform Team, “Independent Study: The Total Economic Impact of Windows Server 2012,” TechNet, January 31, 2013 (<http://blogs.technet.com/b/server-cloud/archive/2013/01/31/independent-study-the-total-economic-impact-of-windows-server-2012.aspx>).

<sup>2</sup> Forrester risk-adjusts the summary financial metrics to take into account the potential uncertainty of the cost and benefit estimates. For more information, see the section on Risks.

<sup>3</sup> Source: Microsoft Server and Cloud Platform Team, “Independent Study: The Total Economic Impact of Windows Server 2012,” TechNet, January 31, 2013 (<http://blogs.technet.com/b/server-cloud/archive/2013/01/31/independent-study-the-total-economic-impact-of-windows-server-2012.aspx>).

<sup>4</sup> *ibid.*

<sup>5</sup> *ibid.*

<sup>6</sup> *ibid.*

<sup>7</sup> *ibid.*

<sup>8</sup> *ibid.*

<sup>9</sup> *ibid.*