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The Total Economic Impact™ Of Windows 7

Multicompany Case Study

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TABLE OF CONTENTS

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 7. Windows 7 is the newest Windows client operating system from Microsoft. To understand the financial impact of of deploying Windows 7, Forrester conducted in-depth interviews with 12 Microsoft customers that have deployed the product and compiled their results into a composite case study of a professional services organization with 5,000 employees and $1 billion in annual revenue.

In conducting in-depth interviews with 12 Microsoft enterprise customers currently using Windows 7, Forrester found that these companies achieved:

- IT labor costs savings and improved IT management from among a range of activities.
- Help desk call reduction due to:
    - Fewer end user questions about new PCs and their operating systems.
    - Fewer or shorter troubleshooting sessions and fewer malware incidents.
- Fewer PC failures, especially those of remote users that become expensive to fix.
- Improved protection of company data and intellectual property.
- PC power management savings and correspondingly lower greenhouse gas emissions due to the PC's more efficient use of electricity.
- Smoother connectivity for remote workers when avoiding the hassle of virtual private network (VPN).
- Better management of remote PCs that are not on the corporate network.
- Reduced bandwidth costs for remote offices.
- Overall boosts to user productivity stemming from a more stable platform, faster startup and shutdown times and better machine responsiveness, improved enterprise search, faster access to company data, and faster, reliable remote connectivity.

Finally, users and IT staff have reported high levels of satisfaction during pilot testing and early deployment stages. "We have 200 highly satisfied users," explained an IT manager interviewed for this study about the first employees to experience Windows 7, "especially on laptops because there are so many improvements."

Purpose

The purpose of this study is to provide readers with a framework to evaluate the potential financial impact of Windows 7 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 7.

Methodology

Microsoft selected Forrester for this project because of its industry expertise in business-class computing and architecture, desktop operating systems, PC management and protection, 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 7:

1. Costs.
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 a 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. Gathered data from existing Forrester research relative to Windows 7 and the desktop operating system market in general.
2. Interviewed Windows 7 product management and strategy personnel to fully understand the potential (or intended) value proposition of Windows 7.
3. Conducted a series of in-depth interviews with twelve organizations currently using Windows 7.
4. Created a composite organization based on the interviews and populated the framework using data from the interviews as applied to the composite organization.
5. Constructed a financial model representative of the interviews. This model can be found in the TEI Framework section below.

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 7, the study illustrated the financial impact of the Windows 7 solution.

Forrester's study yielded the following key findings:

- **ROI.** Based on the interviews with the 12 existing customers, Forrester constructed a TEI framework for a composite organization and the associated ROI analysis illustrating the financial impact areas. As seen in Table 1, the risk-adjusted ROI for the composite company is **129%**, with a breakeven point (payback period) of approximately **thirteen** months after deployment.

- **Benefits.** Quantified benefits accruing to the composite company, which reflect the experience of the organizations interviewed for this study, amount to approximately **$1.5 million** (risk-adjusted, present value [PV]) over a three-year period. These financial benefits include PC build and deployment savings, IT and help desk labor cost savings, salvaged productivity due to fewer machine failures, improved data protection, PC power management savings, VPN cost savings through DirectAccess, and bandwidth cost savings and improved productivity through BranchCache.

- **Costs.** Total costs for the implementation around Windows 7 within the composite company total just more than **$668,000** (risk-adjusted, PV) over the first three years. These costs include hardware costs, implementation labor costs, and training. The composite organization in this study is assumed to have a Software Assurance agreement, so these results do not include license costs or maintenance fees, as those costs are covered by Software Assurance.

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 below.

Table 1: Composite Company ROI, Original And Risk-Adjusted

Summary of financial results	Original estimate	Risk-adjusted
ROI	182%	129%
Payback period (months)	8.9	12.7
Total costs (PV)	$611,954	$667,749
Total benefits (PV)	$1,723,953	$1,530,326
Total (NPV)	$1,112,000	$862,577

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 in order to bring DirectAccess and BranchCache capabilities to users of Windows. As noted above, organizations that were already on Software Assurance should expect to incur lower costs and, accordingly, a higher ROI on Windows 7.

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 its meaning.
- The customers for the interviews were provided by Microsoft; only Forrester and customer employees participated in the interviews.
- Forrester makes no assumptions as to the potential ROI 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 Windows 7.
- This study is not meant to be used as a competitive product analysis.

Windows 7: Overview

Windows 7 is the latest Windows client operating system from Microsoft.

According to Microsoft, Windows 7 is designed to meet the evolving needs of the users and IT professionals — both in and out of the office. Windows 7 Enterprise's features and benefits can drive lower total cost of ownership by helping your users stay productive anywhere, enhancing protection and control, and simplifying PC management across the organization.

Windows 7 can help an organization:

- **Make users productive anywhere.** Employees can work with fewer interruptions because Windows 7 delivers solid performance and reliability from day one. Networking enhancements with Windows Server 2008 R2 enable better access to corporate resources while on the Internet and can reduce bandwidth usage when accessing centralized data from a branch office. Richer search capabilities, along with an enhanced user experience and greater reliability can help increase user productivity.

- **Enhance protection and control.** Windows 7 helps deliver protection of computers and data. Organizations can worry less about sensitive data on lost laptops or USB drives because, in addition to protecting internal hard disks, Windows BitLocker Drive Encryption encrypts external thumb drives and hard disks with BitLocker To Go and provides recovery keys so that the data is accessible when needed. For enterprises that demand the highest levels of compliance, IT professionals can use new application-blocking tools in AppLocker to dictate which applications can run on user computers, providing yet another way to limit the risk of malicious software.

- **Streamline PC management.** Windows 7 makes the job of managing and deploying desktops, laptops, or virtual environments less labor-intensive. Advanced image management and deployment tools enable IT professionals to add, remove, and report on drivers, language packs, and updates and to push those system images to desktops using less network bandwidth. New scripting and automation capabilities based on Windows PowerShell 2.0 reduce the costs of managing and troubleshooting computers. For enterprises making the leap to client virtualization, Windows 7 helps you more easily maintain virtual machine images with the same tools used for physical images and provides a richer user experience over remote connections.

Windows Optimized Desktop Value in the Enterprise

Although the scope of this Forrester case study is focused on Windows 7, Microsoft believes that improving desktop management practices and optimizing IT and desktop infrastructure can help enterprise customers achieve cost savings of hundreds of dollars per PC per year. These best practices span technology, people and processes of managing company PCs. The Windows Optimized Desktop, which includes Windows 7, the Microsoft Desktop Optimization Pack, Windows Server 2008 R2, System Center, and Forefront, delivers key capabilities that enterprises can use to enable better user productivity by giving users anytime, anywhere access to information they need to get their work done while providing the tools IT departments need to support their businesses securely and protect corporate data, achieve cost efficiencies through richer manageability **in both physical and virtual** environments.

For more information, see the Forrester case study, *The Total Economic Impact of Windows Server 2008 R2* and ask about forthcoming studies of Microsoft Desktop Optimization Pack (MDOP) and other Windows Optimized Desktop products.

Analysis

As stated in the Executive Summary, Forrester took a multistep approach to evaluate the financial implication of implementing Windows 7:

- Interviews with Microsoft product management and strategy personnel.
- In-depth interviews with twelve organizations in North America and Europe currently using Windows 7.
- Construction of a composite organization based on characteristics of the interviewed organizations.
- Construction of a financial framework for the implementation of Windows 7.

Interview Highlights

A total of 12 interviews were conducted for this study, involving representatives from the following companies:

1. A large US municipality.
2. A global IT services firm.
3. A multinational manufacturer and marketer of processed foods.
4. One of the world's largest providers of products and services to the energy industry.
5. A leading technology research, manufacturing, and services company.
6. A North American manufacturer of home building and remodeling products.
7. A large retail and commercial bank.
8. A worldwide provider of oil field products and services.
9. A national sports and entertainment franchise.
10. An oil and gas company based in northern Europe.
11. A European accounting and professional services firm.
12. A large air transportation management company.

The interviews with Microsoft's customer organizations uncovered a number of important insights:

- Microsoft customers interviewed for this study are in various stages of implementing Windows 7.
- All of the customer organizations that participated in this study began rolling out Windows 7 as part of their desktop/laptop refresh cycle, in which most users would receive Windows 7

with a new machine. Several customer organizations, however, recognized that deployment efficiencies coupled with new Windows 7 capabilities made a compelling case for accelerated deployment and chose to augment their deployment strategy to include in-place operating system upgrades on capable machines in order to reduce time-to-benefit for their organization.

Most of these companies were using a combination of Windows XP and Windows Vista prior to upgrading to Windows 7. One organization was running almost entirely on Windows Vista. Most had already made significant investment in their application compatibility testing for Vista, which did not have to be repeated for Windows 7 — and this advanced the timeline and reduced the cost of the move to Windows 7.

Key drivers for investing in Windows 7 varied among the companies in the study, including:

- IT support and efficiency: The opportunity to take advantage of zero-touch, light-touch software deployments and to extend IT service capabilities to remote locations with little or no IT support.

- Cost savings: Windows 7 makes it possible for organizations to eliminate costs of redundant software, including VPN systems, encryption tools, software restriction tools, search tools, PC power management tools, and WAN optimization services.

- Connectivity: Using DirectAccess to connect users without the barrier of a VPN, especially when many users in the organization are remote, often at home or visiting customer sites, or are otherwise mobile. “Connecting our employees more conveniently was a major driver, and we wanted to avoid lots of offline islands,” noted an IT manager. “Windows 7 offers compelling protection and convenience improvements.”

- Data protection: Hard drive and removable storage encryption using BitLocker and BitLocker To Go.

- Faster, more assured access to corporate data, information, and dynamic content.

- End user productivity: Several organizations cited the value of enhancing employee productivity, especially during the economic downturn when hiring more staff is difficult, so getting more value by providing better tools to current staff is attractive.

- Data storage: Windows 7 offers improved data backup, folder synchronization, and storage centralization compared with the more limited capabilities of Windows XP and Windows Vista.

- The realization that Windows XP is now eight years old and is in its Extended Support phase, which ends in 2014.

- The perceived benefit of using a modern operating system, which supports and enables new kinds of business scenarios and raises end user satisfaction.

- By adopting Windows 7 early, companies expect to get a long service life from the operating system.

- Companies using the beta version of Windows 7 found that the operating system was very stable and reliable, generating confidence in the software even before its official release.

One company deployed the release code (RC) version to 98% of all users. “The stability on Windows 7 has been really good, ever since the beta,” noted an IT service manager. “We only received the RTM two weeks ago, but the RCs were so solid that we were deploying them across the pilot group’s workstations,” explained another interviewee.

- IT managers reported that they have been happy with the way that Microsoft partnered with third-party hardware and software vendors early on, integrating with other software products and thus easing application compatibility testing and minimizing the risk of incompatibility.

- Users report power consumption benefits in the form of longer battery life, improved sleep/hibernate/standby modes, and more granular PC power management controls that can result in measurable electricity cost savings.

- The biggest area of concern for IT managers leading pilot and deployment efforts was in the area of application compatibility. Testing and project planning were key to risk remediation. Organizations that had completed similar testing related to Windows Vista required fewer resources for the same activities around Windows 7. Also, running some legacy applications in Microsoft Enterprise Desktop Virtualization (MED-V), part of the Microsoft Desktop Optimization Pack, provides an option to continue the use of older applications while adopting Windows 7.

TEI Framework

From the information provided in the in-depth interviews, Forrester has constructed a TEI framework for those organizations considering Windows 7. The objective of the framework is to identify the cost, benefit, risk, and flexibility factors that affect the investment decision.

Composite Organization

Based on the interviews with 12 existing Windows 7 customers, 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 represents a firm that provides design-and-manufacturing-process consulting services around the world. The company generates $1 billion in annual revenue from North American operations in half a dozen sites across the US and Canada and from several locations across the globe. Many of the company’s 5,000 information workers travel frequently to client locations.

Note that organizations at different levels of IT maturity will see a different mix of benefits. For the purpose of this study, the composite organization is viewed as “well managed,” which means that standardized processes and tools are in place to deploy, manage, and support the desktop environment. In this connection, labor to set up deployment infrastructure and process is minimal because those tools and processes are already in place.

Environment Prior To Investment

- A mix of Windows XP and Windows Vista was in place prior to moving to Windows 7.

- Operations and staff are geographically decentralized, with locations in several US and Canadian cities and several offices in the European and Asia Pacific regions.

- The organization covers its Windows operating system with Software Assurance.

- Three-year workstation hardware refresh cycle, with a ratio of desktops to laptops of 35:65.

Reasons For Investment In Windows 7

- Reduce support and management costs by optimizing desktop infrastructure.
- Improve protection of the PC environment.
- Increase business user productivity.
- Increase IT staff productivity.
- Provide a more reliable, higher-performing computing environment.
- Save costs due to lower power consumption.

Framework Assumptions

Table 2 lists the discount rate used in the present value (PV) and net present value (NPV) calculations and the 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: IT Staff Salary Assumptions

Ref.	Metric	Calculation	Value
A1	Hours per week		40
A2	Weeks per year		52
A3	Hours per year		2,080
A4	IT engineer (fully loaded comp.)		$85,000
A5	Hourly	(A4/A3)	$40.86
A6	Help desk (fully loaded comp.)		$65,000
A7	Hourly	(A6/A3)	$31.25

Costs

The main cost categories associated with this implementation of Windows 7 for the composite organization are: 1) internal labor for the Windows 7 pilot project; 2) labor for application compatibility testing and remediation; 3) labor associated with building and deploying new laptops and desktops with the new Windows 7 operating system installed; 4) user training time; 5) time and materials for training, where needed; 6) server hardware; and 7) labor associated with Windows Server 2008 R2. There is no additional cost for Windows 7 license or maintenance, as this is covered under the existing Software Assurance agreement.

The composite organization also decided to implement Windows Server 2008 R2. This will enable it to provide DirectAccess for mobile staff and consultants and BranchCache for six branch offices. As a result, hardware costs and labor associated with implementing Windows Server 2008 R2 are included and described on pages 15-16.

IT Labor — Pilot And Project Management

The IT managers who were interviewed for this study described the internal labor required to plan and pilot Windows 7 for, in this case, 500 users. Two IT managers (two FTEs) would be required for approximately six months. At an hourly loaded rate of $40.86, working on the project plan and pilot rollout for 1,000 hours, this cost amounts to $81,720 in internal labor cost, which is roughly equivalent to one person-year incurred in the initial period (Year 0).

Table 4: IT Labor — Pilot And Project Management

Ref	Metric	Calculation	Initial	Year 1	Year 2	Year 3	Total
A1	Number of FTEs		2				
A2	Hourly rate per person		$40.86				
A3	Hours		1,000				
At	IT labor — pilot and project management	A1*A2*A3	$81,720				$81,720

Source: Forrester Research, Inc.

IT Labor — Application Testing

Application testing/mitigation can be a significant cost category for organizations that depend on hundreds or thousands of applications worldwide, many of which were developed in-house. Determining if there are Windows 7-compatible versions, recoding wherever possible for native Windows 7 compatibility, using compatibility shims to mitigate incompatible applications when recoding is not an option, and virtualizing applications are time-consuming and labor-intensive activities. For the composite company, assume that 250 applications would be tested. One-and-a-half IT staff are assigned to testing. Each application requires an average of 6 hours of labor — although the variance is wide depending on the source of third-party applications and the percentage of those developed in-house — ranging from 20 minutes to days. The total cost amounts to just more than $61,000, which is incurred in the initial pilot period. These assumptions are based on the estimates of compatibility testing recounted by the 12 companies interviewed for this study. Most companies had already achieved some level of compatibility testing as part of the process for evaluating Windows Vista, whether or not they had deployed Vista to their organizations.

Organizations that have already begun application-testing work for Windows Vista will find that, the earlier investment carries value in the Windows 7 deployment. Applications that have been tested or remediated for compatibility for Windows Vista should require only minimal effort to validate for use with Windows 7.

Table 5: IT Labor — Application Testing

Ref	Metric	Calculation	Initial	Year 1	Year 2	Year 3	Total
B1	Number of FTEs		1.5				
B2	Hourly compensation		$40.86				
B3	Hours		1,000				
Bt	IT labor — application testing	B1*B2*B3	$61,290				$61,290

Source: Forrester Research, Inc.

IT Labor — PC Deployment

Deploying PCs is another labor category in the launch and rollout of Windows 7, which is incorporated into the composite company's PC refresh cycle. For the composite organization, assume that each machine would require 1 hour of image and configuration preparation (this is significantly less time than what would be required with Windows XP as described on pages 17-18 below). Windows 7 reduces build and deployment time and user state migration time with the following capabilities: Deployment Image Servicing and Management (DISM), Dynamic Driver Microsoft System Center Configuration Manager can also increase efficiency of Windows 7 deployments.

This analysis assumes that deployment costs will decrease over the span of the deployment curve; less labor is required as the process becomes more streamlined and the marginal cost of that last desktop is significantly less than the cost of deploying the first one. Given the pilot and rollout schedule of 1,500 machines per year, this amount will be equal to just more than $112,000 in labor costs over the initial three-year period.

Table 6: IT Labor — PC Deployment

Ref	Metric	Calculation	Initial	Year 1	Year 2	Year 3	Total
C1	Number of PCs		500	1,500	1,500	1,500	
C2	Hourly compensation		$40.86				
C3	Hours per PC		1	0.75	0.50	0.25	
Ct	IT labor — PC deployment	C1*C2*C3	$20,430	45,968	30,645	15,323	112,365

Source: Forrester Research, Inc.

Training — Users

IT leaders interviewed for this study described the importance of educating users about the capabilities of Windows 7 without the need for a lot of formal training.

"Our education mechanism is self-instruction and on-demand," explained one IT leader. "We assume our employees can use their OS. Yet Windows 7 offers new functionality that could go unexploited without some user education. We want users to take training, but we want to avoid making it mandatory. So we provide 'tips and tricks' videos (available for free on Microsoft.com), lunch-and-learn sessions, and some training for admin groups."

"With the tools and social media, there's a smaller window for training," noted an IT leader for a technology company. He went on to explain that in this economic downturn, his company has spent a lot of resources for educating users via social media tools and Live Meeting and in assembling sufficient education and/or training to get a productivity boost. "If we are going to get the value [from Windows 7], then doubling down on the tips and tricks, 2-minute videos, [and] blogs and training our admin community [are] really important. But most users won't [have to] sit in a training room for 3 hours. It's more about peer interaction, demos, lunch-and-learn, and developing the internal champions, seeding those people into the departments, sharing information on SharePoint, FAQs, and user guides — Microsoft has created quick training videos that we put on a SharePoint site. Lots of folks have Windows Vista at home, so they are not shocked by Windows 7."

This study assumes that users in the composite organization would spend 1.5 hours on average getting oriented to their new operating system when it becomes available to them. At an average fully-loaded hourly compensation rate of $45, this opportunity cost totals just more than $330,000 over the pilot and refresh cycle period.

Table 7: Training — Users

Ref	Metric	Calculation	Initial	Year 1	Year 2	Year 3	Total
D1	Number of employees		400	1,500	1,500	1,500	
D2	Compensation rate		$45				
D3	Hours		1.5				
Dt	Training — users	D1*D2*D3	$27,000	$101,250	$101,250	$101,250	$330,750

Source: Forrester Research, Inc.

Training — Curriculum And Materials Development

Assembling education materials and education/training curriculum development will require two FTEs working for a total of 100 hours, for a cost of $9,000 in the initial period. "Users will be able to reach out to our global learning and development department," explained an interviewee from one of the largest companies in this study, "to get training documents, Webcasts, a computer-based 'course,' a SharePoint site, and Microsoft content."

Table 8: Training — Curriculum And Materials Development

Ref.	Metric	Calculation	Initial
E1	Number of FTEs		2
E2	Compensation rate		$45
E3	Hours		100
Et	Training — curriculum and materials development	E1*E2*E3	$9,000

Source: Forrester Research, Inc.

Server-Related Costs

Several potential areas of potential Windows 7 benefit are dependent on implementation of the Windows Server 2008 R2 infrastructure and/or conversion to the IPv6 protocol. While many organizations are already actively planning and separately budgeting a server upgrade project, for other organizations the Windows Server 2008 R2 platform may represent an incremental investment. The composite company synthesized for this analysis is assumed to have a separately budgeted server upgrade project, and this model reflects only those incremental costs directly associated with achieving value from Windows 7, specifically the BranchCache and DirectAccess capabilities.

Windows Server 2008 R2 License Costs

As with the case of Windows Vista and Windows 7, for organizations that previously employed Windows Server 2008, the licenses for Windows Server 2008 R2 are provided at no additional cost if the customer also has a Software Assurance agreement.

Hardware Costs

To support Windows Server 2008 R2 implementation that will enable DirectAccess and BranchCache, the composite company will need to purchase 12 additional servers at $5,500 each. The total hardware cost is $66,000.

Table 9: Hardware Costs

Ref	Metric	Calculation	Initial	Year 1	Year 2	Year 3	Total
H1	Cost of servers			$5,500	$5,500		
H2	Number of units — BranchCache			3	3		
H3	Number of units — DirectAccess			3	3		
Ht	Hardware costs	H1*(H2*H3)		$33,000	$33,000		$66,000

Source: Forrester Research, Inc.

IT Labor — Windows Server 2008 R2

Internal labor costs for implementation of Windows Server 2008 R2 include the time the organization will spend on the planning, testing, implementation, and post-implementation testing.

To implement DirectAccess, the composite organization will spend an estimated 50 days or 400 man-hours or more of IT engineering time. This cost category is dependent on the scale of the deployment, a company's readiness for IPv6 and IPsec, as well as infrastructure updates to its DNS and/or public key infrastructure (PKI).

It is estimated that the organization will spend 25 days or 200 man-hours of IT engineering time on implementing BranchCache for six branch offices. This includes preplanning and post-implementation testing.

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 five weeks of work for one staff at 50% of his time, equivalent to 100 man-hours.

At a fully loaded cost per hour of $40.86 per IT engineer FTE and 700 hours, the total implementation cost for the composite organization is $28,600 over three years.

Table 10: IT Labor — Windows Server 2008 R2

Ref	Metric	Calculation	Initial	Year 1	Year 2	Year 3	Total
I1	Hourly compensation			$40.86	$40.86		
I2	DirectAccess	hours		200	200		
I3	BranchCache	hours		100	100		
I4	Business process change	hours		50	50		
It	IT labor — Windows Server 2008 R2	I1*(I2+I3+I4)	-	$14,300	$14,300		$28,600

Source: Forrester Research, Inc.

Total Costs

The costs described above are summarized in Table 11 below. The cost for the Windows 7 project, including DirectAccess and BranchCache, amounted to just over $780,000 over a three-year analysis.

Note that costs, particularly those associated with labor for implementation, are highly dependent on the unique aspects of an organization's infrastructure and client environment.

Table 11: Total Costs

Costs	Initial	Year 1	Year 2	Year 3	Total
IT labor — pilot and project management	81,720				81,720

IT labor — application testing	61,290				61,290
IT labor — PC deployment	20,430	45,968	30,645	15,323	112,365
Training — users	27,000	101,250	101,250	101,250	330,750
Training — curriculum and materials development	9,000				9,000
Hardware costs		33,000	33,000		66,000
IT labor — Windows Server 2008 R2		14,300	14,300		28,602
Total	$199,440	$194,519	$179,196	$116,573	$689,727

Source: Forrester Research, Inc.

Benefits

> *"As part of the value analysis, we have investigated and modeled the following value proposition: 1) end user productivity improvements; 2) improvements for the IT administrators; [and] 3) degree the OS is leveraging hardware platform features. Our data shows that Windows 7 performs significantly better than Windows Vista and Windows XP. Our financial analysis of these benefits has a clear positive return on investment, i.e., the benefits outweigh the transition cost."* (Deputy CIO, Fortune 100 technology company)

In interviews with Microsoft customers, Forrester identified the following benefit categories of Microsoft Windows 7: 1) labor cost savings for building and deploying new PCs in the company hardware refresh cycle; 2) help desk call reductions; 3) fewer laptop failures for remote and mobile workers; 4) improved protection for the company's data; 5) PC power cost savings; 6) IT management savings due to DirectAccess; and 7) bandwidth cost avoidance due to BranchCache.

PC Build And Deployment Savings

"We've cut [the] time it takes to roll out a desktop from 3 hours to a little less than 1 hour," recounted one IT manager interviewed for this study. Other interviewees echoed the ease of PC deployment for new or re-imaged machines when Windows 7 is installed. Improved image development, deployment, and management; fewer images to manage; fewer software updates; and leveraging the Multilingual User Interface capabilities result in at least a 50% reduction in the time required to provision users with new or rebuilt machines. For some organizations, time requirements for imaging and PC preparation dropped from one day to minutes. Interviewees reported that they reduced the time required for mundane tasks via automation and scripting; it has served to enrich their jobs, and they are now free to pursue more strategic projects beyond day-to-day operational support.

The table below shows the calculation of this benefit category. Not including the 500 PCs involved in the pilot stage, the composite organization can be expected to save 1.5 hours per machine for each of the 1,500 machines per year over the course of its PC refresh cycle, or a total of more than $275,000.

Table 12: PC Build And Deployment Savings

Ref.	Metric	Calculation	Year 1	Year 2	Year 3	Total
J1	Number of PCs deployed per year		1,500	1,500	1,500	
J2	Time savings per PC (hours)		1.5			
J3	IT labor cost per hour		$40.86			
Jt	PC build and deployment savings	J1*J2*J3	$91,935	$91,935	$91,935	$275,805

Source: Forrester Research, Inc.

Help Desk Call Reduction — New PC Questions

"Previously, when replacing desktops, it required an average of three incoming support calls for each machine to be really up and running," explained the head of IT for a major municipality. "Oftentimes, these issues were driver- or printer-related. We [expect] Windows 7 to kill these calls altogether." Eliminating those initial calls to the help desk results in significant cost savings. Forrester conservatively assumes 2.5 calls per new machine would be avoided due to better OS stability and fewer crashes and reliability issues, fewer software corruption issues due to users installing unsupported applications, and fewer connectivity issues with the manual VPN connection experience removed altogether. At a conservative per-call cost estimate of $20, the resulting value is $250,000 over three years, which can be re-invested from mundane tasks and applied to business-critical initiatives.

Table 13: Help Desk Call Reduction — New PC Questions

Ref.	Metric	Calculation	Year 1	Year 2	Year 3	Total
K1	Number of PCs with Windows 7		2,000	1,500	1,500	
K2	Number of calls avoided per PC		2.5			
K3	Cost per call		$20			
Kt	Help desk call reduction — new PC questions	K1*K2*K3	$100,000	$75,000	$75,000	$250,000

Source: Forrester Research, Inc.

Help Desk Workload Reduction — Troubleshooting, Fewer Malware Incidents, And VPN Issues

"As the upgrade goes more smoothly with hardened protection and a more stable platform in general, we anticipate getting fewer calls," explained an IT manager for a major oil company. Study

participants described help desk workload reduction beyond the initial deployment of new machines to users. Greater system stability, Windows troubleshooting packs, Problem Steps Recorder, Resource Monitor, Startup Repair, Reliability Monitor, and user self-help features result in a drop in call volume to the company's help desk as well as shorter calls when issues are resolved faster. Interviewees described a compression or reduction of workload at the call center stemming from fewer calls (when users can do their own troubleshooting or ask their peers for help), shorter calls (when call center staff can troubleshoot users' system questions faster using the Problem Steps Recorder), and a reduction or near elimination of malware incidents and remediation due to the additional control over the software users can install on their machines with the use of AppLocker. "We feel increasingly better about the [application] protection and group policy," said one interviewee. "We can reduce our cost of support, as there will be fewer calls to help desk." And as the organization adopts greater usage of the Windows PowerShell 2.0 scripting environment and its command-line language, support can be further enhanced by enabling IT to automate common tasks and remotely troubleshoot and repair PCs across the network. Finally, help desk staff are expected to respond to fewer issues related to user difficulties with VPN connections (see page 22 below).

Based on the interviews as well as Forrester's research in this area, the table below shows the calculation of a 20% IT support workload reduction, which accrues to the composite company as the PC refresh cycle with Windows 7 machines rolls out over three years (40%, 70%, and 100% in Years 1 through 3, respectively, shown on line L5). The resulting value totals $546,000 over the three-year period.

Table 14: Help Desk Workload Reduction — Troubleshooting, Fewer Malware Incidents, And VPN Issues

Ref.	Metric	Calculation	Year 1	Year 2	Year 3	Total
L1	Number of help desk staff		20			
L2	Hours		2,080			
L3	Workload reduction percentage		20%			
L4	Hourly compensation		$31.25			
L5	Windows 7 percentage — rollout schedule		40%	70%	100%	
Lt	Help desk workload reduction — troubleshooting, fewer malware incidents, and VPN issues	L1*L2*L3* L4*L5	$104,000	$182,000	$260,000	$546,000

Source: Forrester Research, Inc.

Remote And Mobile Workers — PC Failures Avoided

When consultants who are working remotely experience a PC failure, the resulting work and communications handicaps are costly. For the composite organization, with many of its consultants working at client sites or traveling, a reduction of such incidents is a significant benefit that results from greater system stability and greater supportability. All customers in this study reported to Forrester that their Windows 7 users experience measurably fewer "blue screen" occurrences, forced reboots, sleep mode failures, and crashed applications. Assume that the number of failure

incidents avoided would ramp up as new machines are deployed. Windows 7 data backup and restore process improvements and system restore features further support quick returns to productive activity. If each incident avoided results in two days of computing and PC communication that would otherwise have been lost, then the calculated benefit is greater than $400,000 over three years, as show in Table 15 below.

Table 15: Remote And Mobile Workers — PC Failures Avoided

Ref.	Metric	Calculation	Year 1	Year 2	Year 3	Total
M3	Number of remote PC failure incidents avoided		65	115	160	
M4	Compensation per hour		$75			
M5	Number of hours saved per incident		16			
Mt	Remote and mobile workers — PC failures avoided	M1*M2*M3	$78,000	$138,000	$192,000	$408,000

Source: Forrester Research, Inc.

Improved Protection Of Company Data

With many users on the move — and lots of company and client data on their machines — intellectual property and sensitive data are constantly exposed to loss and theft. Especially with the proliferation of USB/flash drives and the ability to easily move large files, it is paramount for enterprises to have the ability to easily encrypt embedded and portable drives. For one professional services organization in this study, the No. 1 reason for adopting Windows 7 Enterprise was the ability to deploy BitLocker and BitLocker To Go. “Flash drives being as popular as they are, encrypting the mobile drives was our biggest driver [for moving to Windows 7],” explained one IT manager.

In this study, Forrester conservatively assumes that the composite company would confront a dozen instances per year where the firm could be exposed to financial loss due to IP loss or theft. The encryption capabilities of Windows 7 Enterprise are assumed to reduce the risk of exposure to such instances from 10% to just one-half of 1%. Assuming the cost to address the failure is $100,000 per instance, then the value of the reduction of this risk is up to $114,000 annually, as shown in Table 16. Note that this calculation is *exceedingly conservative* and is not based on any estimates provided by the interviewed companies.

Table 16: Improved Protection Of Company Data

Ref.	Metric	Calculation	Year 1	Year 2	Year 3	Total
N1	Potential number of incidents		12			
N2	Potential exposure		$100,000			
N3	Probability of exposure — without BitLocker, BitLocker to Go		10%			
N4	Probability of exposure — with BitLocker		0.5%			

N5	Percent captured (per rollout schedule)		40%	70%	100%	
Nt	Improved protection of company IP	N1*N2*(N3-N4)*N5	$45,600	$79,800	$114,000	$239,400

Source: Forrester Research, Inc.

PC Power Savings

Organizations interviewed also noted that one of the anticipated benefits of Windows 7 is more efficient power consumption when compared with machines running Windows XP or Windows Vista. Several organizations described forecasts for power cost savings of $30 to $60 per machine. Forrester research corroborated this range of savings, which results from greater use of the sleep/standby/hibernate function on more machines, enforced by Group Policies. Table 17 below calculates the value of $35 annual power cost savings for only the machines that are regularly connected at company facilities (40%) and not for remote or mobile workers who often work at their clients' offices.

Table 17: PC Power Savings

Ref.	Metric	Calculation	Year 1	Year 2	Year 3	Total
P1	Number of PCs with Windows 7		2,000	3,500	5,000	
P2	Number of Windows 7 PCs at company locations	P1*40%	800	1,400	2,000	
P3	Power cost savings per PC		$35			
Pt	PC power savings	P2*P3	$28,000	$49,000	$70,000	$147,000

Source: Forrester Research, Inc.

Windows Server 2008 R2 And Windows 7

> *"Windows Server 2008 R2 delivers bang for the buck. This will lead to greater productivity for us."* (Assistant to the CIO — major technology company)
>
> *"BranchCache and DirectAccess will be huge for us."* (Assistant director — IT, major US municipality)

Half of the Microsoft customers interviewed for this study are in early stages of implementing DirectAccess and BranchCache. Given the early stage of experience with both of these new products, Forrester takes a conservative position toward quantifying their benefits in this study. For more information, please refer to *The Total Economic Impact of Windows Server 2008 R2*, a Forrester case study that focuses specifically on these and other related capabilities. Nevertheless, Forrester learned from customers that have engaged in Microsoft Windows Server 2008 R2 pilot

projects that certain benefits described below can be described and (conservatively) quantified with confidence. Subsequent studies will expand on the findings presented here.

DirectAccess With Windows Server 2008 R2 And Windows 7

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

The organizations Forrester interviewed that piloted and plan to fully implement 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.

With DirectAccess, consultants will be able to immediately and securely access the required data for their projects without the complexity and uncertainty of establishing a VPN connection. Staff working at home or traveling will have a less frustrating connection. One customer estimated that a full deployment to its worldwide remote employees will save between 10% and 15% of their time with easier, faster connectivity and fewer required return trips to company offices. Further, DirectAccess makes IT's job of managing remote computers easier when technicians can apply policies, software updates, or troubleshooting and client health checks whenever machines are connected to the Internet. That kind of care leads to greater system stability, which results in fewer incoming calls for help. "It saves lots of time for the techs. Users [from around the world] call us less frequently, so we can get more sleep," explained an IT manager. Protection is also enhanced when certain corporate resources are available to users but not exposed to the Internet. Finally, there can be savings on bandwidth costs.

In this study, the benefit to the composite organization from DirectAccess is conservatively estimated as a function of management savings for its IT staff and a contribution to the overall productivity improvement for users.

IT Management Savings — DirectAccess

The composite organization also sees management savings for its IT team due to the use of DirectAccess. IT engineers will be able to manage the PCs of mobile workers as easily as they can for the desktops of users at corporate facilities.

This saves the 2.5 IT engineers responsible for these PCs 7 hours per week each. For one year, these savings translate to 364 hours saved. At an hourly rate per FTE of $40.86, the total IT management savings for the composite organization over three years is $78,000.

Table 19: IT Management Savings — DirectAccess

Ref.	Metric	Calculation	Year 1	Year 2	Year 3	Total
Q1	Number of FTEs		2.5			
Q2	Hourly rate per FTE		$40.86			
Q3	Number of hours (saved)	7 hours*52 weeks	364			
Q4	Percent captured		40%	70%	100%	
Qt	IT management savings		$14,875	$26,031	$37,188	$78,094

Source: Forrester Research, Inc.

BranchCache With Windows Server 2008 R2 And Windows 7

> *"[As] we have a large number of offices that are far away — in Canada, Africa, South America, the Middle East, [and] Kazakhstan — there is a performance hit on the communication line accessing central services. BranchCache gives users a better experience, and the size and speed of the pipe become less important, so there should be some cost savings there."* (IT services manager, global oil and gas producer)

BranchCache in Windows Server 2008 R2 and Windows 7 Enterprise enables copies of data accessed from an organization's intranet Web and file servers to be cached locally within a 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: 1) as a distributed cache where PCs host the data, or 2) as a 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 Ultimate.

Organizations interviewed that have piloted BranchCache noted that benefits include: 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 available with BranchCache.

Initial tests by some interviewed customers indicate that BranchCache can improve access time for users in the branch offices by 60%. This performance improvement compares with a 20% expected improvement for a planned bandwidth upgrade.

Bandwidth Upgrade Cost Avoidance — BranchCache

The composite organization can expect to avoid a planned $30,000 bandwidth upgrade to meet access requirements at the branches and would have had to incur bandwidth upgrades in subsequent years. The organization will set up a hosted cache, with a server running Microsoft Windows Server 2008 R2 at each branch, with Windows 7 Enterprise installed on all desktops at the branch offices. This will save the company $180,000 over three years.

Table 20: Bandwidth Upgrade Cost Avoidance — BranchCache

Ref.	Metric	Calculation	Year 1	Year 2	Year 3	Total
R1	Number of branch offices (upgraded)			3	3	
R2	Cost per location	$30,000				
Rt	Bandwidth upgrade cost avoidance — BranchCache	R1*R2	--	$90,000	$90,000	$180,000

Source: Forrester Research, Inc.

Incremental Productivity: Search, Startup/Shutdown, BranchCache, And DirectAccess

With the ability to access important data and applications faster and more reliably, Forrester expects that the productivity for remote and branch office users will improve due to DirectAccess and BranchCache. One customer interviewed for this study estimated that DirectAccess would save mobile workers between 10 and 30 minutes per day, or it could save an entire day for the user whose machine avoids a virus.

In addition to DirectAccess and BranchCache, the capabilities of Windows 7 that will increase user and IT staff productivity include search and federated search functionality, faster startup and shutdown times, more reliable shutdown and hibernation experiences, and better overall operating system stability. As one interviewee explained to Forrester, "Boot and shutdown times will be major benefits to user productivity. People aren't getting their coffee because what used to take as much as 5 minutes now takes less than 30 seconds."

A large technology company that participated in this study, for example, conducted user surveys and used Social Computing forums, wikis, and others to gauge its users' satisfaction and collect all types of feedback during an extensive pilot of the new software. This customer's initial expectation after the pilot is for a 10% improvement in system performance, 30% fewer blue screen incidents compared with its current Windows XP environment, and generally a more stable computing platform. In estimating the increase in employee productivity, this company is currently using what IT managers consider a conservative 10% amount. This estimate is based on subjective data from surveys, empirical data, and a TCO analysis. Other reports and anecdotal data from Microsoft customers that participated in this study include these verbatims:

- "The boot-up and shutdown times, the application start and shutdown times, and Internet Explorer 8 responsiveness times have been enhanced considerably. That is worth a few minutes per day per person."

- "Search capabilities that are built into the new OS are superior; although we haven't quantified the benefits or savings yet, it's a lot easier and faster to find [files]."

- "We easily see a 10% responsiveness improvement (multitasking, boot time, etc.) [and] 30% [less] blue screens that we measured versus the current XP environment (even with the beta version of Windows 7). Reports and feedback say responsiveness translates directly to user productivity."

- "There is a productivity improvement, especially on laptops. We save electricity, too. . . . Desktop PCs on XP did not use the sleep function, but we expect every machine will be configured with it now, and we will save money."

- "The faster boot-up is worth 3 minutes. When staff carry their laptops into meetings, they can now avoid the hassle of connecting to the VPN, similar to the inconvenience that mobile users experience several times per day, whether traveling or moving around the building. There is much less frustration. It is a smoother experience."

- "We expect more user uptime due to better product stability."

- "Call centers are very sensitive to startup times. When it's logon time, for a shift change, it takes 45 seconds now compared [with] 7 minutes before."

- "[The improvement in basic machine responsiveness] will save . . . 5 to 10 minutes per day. Machines are snappier, and search, between SharePoint and OCS, is helping us to create a more collaborative workspace."

The value of incremental productivity is unique to each organization, and the willingness and ability to measure or estimate its value varies from company to company. Interviewees voiced their belief that productivity improvement will accrue for their users of Windows 7, especially when combined with Windows Server 2008 R2 for DirectAccess and/or BranchCache, yet some interviewees were reticent to estimate the magnitude of this benefit category at this early stage of deployment. Users of this study are encouraged to consider the value of improved user productivity using a simple,

conservative calculation similar to the one below. In this example, Forrester shows a 20-minutes-per-day (4.2% average productivity improvement) benefit among the 5,000 users in the composite company. Assume also that only 50% of this increase would be directed at greater output. These conservative assumptions point toward significant value. Note that if the benefits described above are included in the financial framework, the ROI for this analysis would be approximately 375%.

Table 21: Incremental Productivity: Search, Startup/Shutdown, BranchCache, And DirectAccess

Ref.	Metric	Calculation	Year 1	Year 2	Year 3	Total
S1	Number of workers		2,000	3,500	5,000	
S2	Hourly compensation		$55			
S3	Minutes per day		20			
S4	Days		250			
S5	Percent captured		50%			
St	Incremental productivity: search, startup/shutdown, BranchCache, and DirectAccess	S1*S2*(S3/480)*S4*S5	$572,917	$1,002,604	$1,432,292	$3,007,813

Source: Forrester Research, Inc.

Note on percent captured: Forrester assumes that for information workers, only a portion of the time gained from improved productivity — ranging from 50% to 75% — would actually be realized by the organization; not all of the time saved will be converted into productive output. This percentage is higher for workers engaged in more task- and process-related activities.

Total Benefits — Quantified

The sum of the quantified benefits of Windows 7 accruing to the composite company is $2.5 million over three years. Readers of this study should recall that Forrester has calculated only the benefits that the interviewed Microsoft customers have experienced or were able to quantify within a range of estimates. Readers who are considering implementing the Windows 7 solution should use this study as a starting point for their organization's business case for Windows 7; there may be other quantifiable benefits of Windows 7 particular to your organization that have not been quantified herein.

Table 22 summarizes the annual amounts and total of the benefits described above.

Table 22: Total Benefits

Benefits	Year 1	Year 2	Year 3	Total
PC build and deployment savings	$91,935	$91,935	$91,935	$275,805
Help desk call reduction	$100,000	$75,000	$75,000	$250,000

Help desk workload reduction — troubleshooting, fewer malware incidents, and VPN issues	$104,000	$182,000	$260,000	$546,000
Remote and mobile workers — PC failures avoided	$78,000	$138,000	$192,000	$408,000
Improved protection of company IP	$45,600	$79,800	$114,000	$239,400
PC power savings	$28,000	$49,000	$70,000	$147,000
IT management savings — DirectAccess	$14,875	$26,031	$37,188	$78,094
Bandwidth upgrade cost avoidance — BranchCache		$90,000	$90,000	$180,000
Total	$462,410	$731,766	$930,123	$2,124,299

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, as 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 the labor cost for Windows 7 pilot and project management. The $81,720 or 1,000 hours used in this analysis can be considered the “most likely” or expected value. Implementation costs may vary based on the number of users, language requirements, server configuration, and the like. This variability represents a risk that is captured as part of this study. Forrester uses a risk factor of 130% 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 110% as the mean (110% is equal to the sum of 130%, 100%, and 100% divided by three). Forrester applies this mean to the most likely estimate, $81,720, to arrive at a risk-adjusted value of $89,982.

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 help desk call volume savings.

- **Cost avoidance savings.** Variability in the requirements for cost avoidance savings on software, power, VPN system cost elimination, and avoiding broadband upgrades 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 23: Risk Factors — Costs And Benefits

	Factor	Low	Orig.	High	Mean
Costs	IT labor — pilot and project management	100%	100%	130%	110%
	IT labor — application testing	80%	100%	200%	127%
	IT labor — PC deployment	100%	100%	120%	107%
	Training — users	100%	100%	120%	107%
	Training — curriculum and materials	100%	100%	120%	107%
	Hardware costs	100%	100%	110%	103%
	IT labor — Windows Server 2008 R2	100%	100%	130%	110%
Benefits	PC build and deployment savings	60%	100%	100%	87%
	Help desk call reduction — new PC questions	60%	100%	100%	87%
	Help desk workload reduction — troubleshooting, fewer malware incidents, and VPN issues	50%	100%	125%	92%
	Remote and mobile workers — PC failures avoided	60%	100%	100%	87%
	Improved protection of company IP	60%	100%	100%	87%
	PC power savings	60%	100%	100%	87%
	IT management savings — DirectAccess	60%	100%	100%	87%
	Bandwidth upgrade cost avoidance — BranchCache	80%	100%	103%	94%

Source: Forrester Research, Inc.

The risk factors in Table 23 are applied to the benefits and costs listed earlier, resulting in the risk-adjusted cost and benefit values in Tables 24 and 25:

Table 24: Total Costs — Risk-Adjusted

Costs	Initial	Year 1	Year 2	Year 3	Total	Present value
IT labor — pilot and project management	89,892				89,892	89,892
IT labor — application testing	77,634				77,634	77,634
IT labor — PC deployment	21,860	65,580	65,580	65,580	218,601	184,949
Training — users	28,890	108,338	108,338	108,338	353,903	298,309
Training — curriculum & materials	9,630				9,630	9,630
Hardware costs		33,990	33,990		67,980	58,991
IT labor — Windows Server 2008 R2		15,731	15,731		31,462	27,302
Total	$227,906	$207,244	$190,849	$124,733	$750,731	$667,749

Source: Forrester Research, Inc.

Table 25: Total Benefits — Risk-Adjusted

Benefits	Year 1	Year 2	Year 3	Total	Present value
PC build and deployment savings	79,983	79,983	79,983	239,950	198,907
Help desk call reduction — new PC questions	87,000	65,250	65,250	217,500	182,040
Help desk workload reduction — troubleshooting, fewer malware incidents, and VPN issues	95,333	166,833	238,333	500,500	403,609
Remote and mobile workers — PC failures avoided	67,860	120,060	167.040	354,960	286,414
Improved protection of company IP	39,672	69,426	99,180	208,278	167,958
PC power savings	24,360	42,630	60,900	127,890	103,132
IT management savings — DirectAccess	12,941	22,647	32,353	67,942	54,789
Bandwidth upgrade cost avoidance — BranchCache		84,600	84,600	169,200	133,479

Total	$407,150	$651,430	$827,640	$1,886,220	$1,530,326

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 7:

- The Microsoft Desktop Optimization Pack (MDOP): Available to Software Assurance customers for use with Windows 7, the MDOP suite enhances application deployment and compatibility, increases IT responsiveness and end user uptime, and helps reduce costs of desktop software and IT management. Each of the six technologies employed by MDOP represents a flexibility option:
    - Microsoft Application Virtualization (App-V) turns applications into centrally managed services that are not installed, do not conflict, and are streamed on demand to end users.
    - Microsoft Enterprise Desktop Virtualization (MED-V) provides deployment and management of virtual PC images to enable key enterprise scenarios, primarily application compatibility with Windows Vista and Windows 7.
    - Microsoft Advanced Group Policy Management (AGPM) provides governance and control over Group Policy through change management and role-based administration.
    - Microsoft Asset Inventory Service (AIS) is a hosted service that collects software inventory data and translates it into business intelligence.
    - Microsoft Diagnostics and Recovery Toolset (DaRT) reduces downtime by accelerating desktop repair, recovery, and troubleshooting of unbootable Windows-based desktops.
    - Microsoft System Center Desktop Error Monitoring (DEM) enables proactive problem management by analyzing and reporting on application and system crashes.
- Driving leading-edge technology as a means to attract and retain employees with a modern desktop environment.
- Leveraging state-of-the-art desktop management tools such as System Center Configuration Manager to ensure that the desktop environment is flexible, supportable, and secure.

For Microsoft customers that begin with a Windows 7-only deployment, a host of flexibility options are created by incorporating the capabilities of Windows Server 2008 R2, including:

- BranchCache features provided to some or 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.
- DirectAccess provided to some or all mobile users will also correspond to additional cost avoidance savings, IT management savings, and improved productivity for mobile users.
- Remote Desktop Services to provided 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. These enhancements also provide a richer end user experience in VDI scenarios.

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 an ROI, NPV, and payback period. Table 26 shows the consolidation of the numbers for the composite organization.

Table 26: Total Benefits — Risk-Adjusted

Summary of financial results	Original estimate	Risk-adjusted
ROI	182%	129%
Payback period (months)	8.9	12.7
Total costs (PV)	$611,954	$667,749
Total benefits (PV)	$1,723,953	$1,530,326
Total (NPV)	$1,112,000	$862,577

Source: Forrester Research, Inc.

It is important to note that values used throughout the TEI framework are based on in-depth interviews with twelve 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 7.

Study Conclusions

Forrester's interviews with Windows 7's customers yielded several important observations. Forrester found that organizations can realize benefits in the form of:

- IT labor costs savings, improved IT management, and help desk call volume reduction.
- Fewer PC failures, especially those of remote users that become expensive to fix.
- Improved protection of company data and intellectual property.
- Cost savings from third-party tools made redundant by Windows 7 and Windows Server 2008 R2.
- PC power management savings.
- Smoother connectivity for remote workers without VPN barriers.
- Productivity savings for IT management as well as bandwidth cost savings for branch offices by implementing BranchCache through Windows 7.
- Overall boosts to user productivity stemming from a more stable platform, faster boot-up and machine response times, improved enterprise search, faster access to company data, and faster, reliable remote connectivity.

Finally, users and IT staff can expect high levels of satisfaction and machine responsiveness.

The financial analysis provided in this study illustrates how an organization may evaluate the value proposition of Windows 7. Based on information collected in twelve customer interviews, Forrester calculated a three-year risk-adjusted ROI of 143% for the composite organization, with a payback period of less than 12 months. All final estimates are risk-adjusted to incorporate potential uncertainty in the calculation of costs and benefits. Using the TEI framework, many companies may find the potential for a compelling business case to make such an investment.

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

Jeffrey North, Principal Consultant

Jeffrey North is a principal 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, risk, and flexibility of investments.

Jeff came to Forrester with consulting and operating experience, notably working with fast-growth companies. He was a founding member of the digital strategy practice at Cambridge Technology Partners (acquired by Novell), where he specialized in business value justification of technology investments and customer advocacy for enterprise clients. As a director in the international and catalog business units at Staples, Jeff built and managed metrics and reporting programs in North America and Europe as the company experienced significant growth. He has also consulted in a business-IT capacity to retailers and life sciences companies.

Jeff holds a B.A. from St. Lawrence University and an M.B.A. with a concentration in international management and finance from the Thunderbird School of Global Management.