A Forrester Total Economic Impact™ Study

Commissioned By

HP and Intel

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The Total Economic Impact™ Of HP ProLiant BL460c Gen8 Blade Server

As Deployed And Used By A Financial Services Organization

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Table Of Contents

ABOUT FORRESTER CONSULTING

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Executive Summary

Medium to large organizations often struggle with the complexity of server operations as well as the physical aspects of connecting these servers to the enterprise infrastructure as their infrastructure grows. Over the years, they have accumulated different types and models of servers with different procedures, different upgrade cycles, and other requirements that complicate the work of the IT department.

At first sight, standardizing the total server infrastructure on hardware bladed environment might seem to be a costly endeavor, but it may result in increased performance for the business, cost reductions from consolidations, and simplified server administration.

HP and Intel commissioned Forrester Consulting to conduct a Total Economic Impact™ (TEI) study and examine the potential return on investment (ROI) enterprises may realize by deploying HP ProLiant BL460c Gen8 blade servers. The purpose of this study is to provide readers with a framework to evaluate the potential financial impact of the HP ProLiant BL460c Gen8 blade servers on their organizations.

"One of our main goals is to expand the business. Now that we have standardized on the HP BladeSystem c-Class enclosures and the HP ProLiant Gen8 blade servers, we can confidently say that we can support the growth of the business."

~ Server and storage infrastructure manager

The HP BladeSystem is a modular architecture that shares power, cooling, network, and storage infrastructure via the blade enclosure. The HP ProLiant BL460c Gen8 is a two-socket blade server powered by up to two Intel Xeon processors and designed for data center computing. For a more detailed overview of the HP ProLiant BL460c Gen8, please refer to page 18.

To better understand the benefits, costs, and risks associated with an HP ProLiant BL460c Gen8 blade server deployment, Forrester interviewed a financial services organization based in Western Europe that had invested in 485 HP ProLiant BL660c Gen8 servers and had experience in using them in production for more than six months. Prior to the HP ProLiant BL460c Gen8 servers, the organization used a variety of other servers, the majority of which included HP blade servers of previous generations. In 2014, the business decided to consolidate its data centers and standardize on the Gen8 servers.

THE HP BLADESYSTEM WITH HP PROLIANT BL460C GEN8 SERVERS ENABLED THE INTERVIEWED COMPANY TO DRIVE CONSOLIDATION COST SAVINGS AND INCREASE PERFORMANCE FOR THE BUSINESS

Our interview with this financial services company and subsequent financial analysis found that this organization expects to experience the risk-adjusted ROI benefits and costs shown in Figure 1.[1]

The four-year financial analysis points to estimated benefits of approximately $6 million versus hardware and deployment costs of $5.3 million, adding up to a net present value (NPV) of $786,000. The average server performance has increased by 200%, and the time it takes to deploy a new server has been reduced by half.

FIGURE 1

Financial Summary Showing Four-Year Risk-Adjusted Results

ROI: 15%	NPV: $786,000	Server deployment time: ↓ 50%	Server performance: ↑ 200%

Source: Forrester Research, Inc.

› **Benefits.** In conducting in-depth interviews with this existing HP customer, Forrester found that the company expects to achieve risk-adjusted benefits of about $6 million over a four-year period. In particular, the interviewed organization expects to achieve:

- **Avoided hardware support costs of approximately $3.8 million.** With the deployment of the new BL460c Gen8 servers, the organization was able to retire 900 legacy physical servers. It therefore avoided extending the associated hardware support contracts.
- **Software consolidation cost savings of $1.2 million.** The consolidation of physical servers from 900 to 485 enabled the company to reduce the number of required virtual server and operating system licenses, resulting in direct cost savings.
- **Administration labor cost savings of approximately $683,000 over the four years.** Due to the server consolidation, the standardization of the server landscape to one single model, more efficient management due to new server capabilities such as agentless hardware monitoring, and the higher reliability of the Gen8 servers as compared with the previous environment, the company was able to re-allocate the equivalent of two full-time engineers to other tasks.
- **Data center facility cost savings of approximately $310,000.** The reduced infrastructure footprint in the data centers of the company resulted in a reduction of data center facility costs.
- **Increased scalability and performance.** The interviewed organization considers that the new server infrastructure can be scaled up or down more easily. Furthermore, it reported an increase in performance of the bank's trading platform. While the Gen8 servers contribute to the improved performance, there were many other factors that played a role, and the sole impact of the servers could not be determined. The improved performance has therefore not been quantified in financial terms in this case study.

› **Costs.** To realize the above benefits, the interviewed organization experienced the following risk-adjusted costs:

- **Hardware and support costs of approximately $5.1 million.** At the time of the interview, the company had invested in 485 HP ProLiant BL460c Gen8 servers. The costs include the HP blade servers and the hardware support for four years.
- **Installation and deployment costs of approximately $157,500.** These internal labor costs account for 300 man-days that were required for deploying the 485 HP ProLiant BL460c servers, migrating the workloads, putting the servers into production, and retiring the previous servers.

Disclosures

The reader should be aware of the following:

- The study is commissioned by HP and Intel 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 HP BladeSystem with HP ProLiant BL460c Gen8 blade servers.
- HP 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.
- HP provided the customer name for the interview but did not participate in the interview.

TEI Framework And Methodology

INTRODUCTION

From the information provided in the interview, Forrester has constructed a Total Economic Impact (TEI) framework for those organizations considering deploying HP ProLiant BL460c Gen8 blade servers. 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 HP ProLiant BL460c Gen8 blade servers can have on an organization (see Figure 2). Specifically, we:

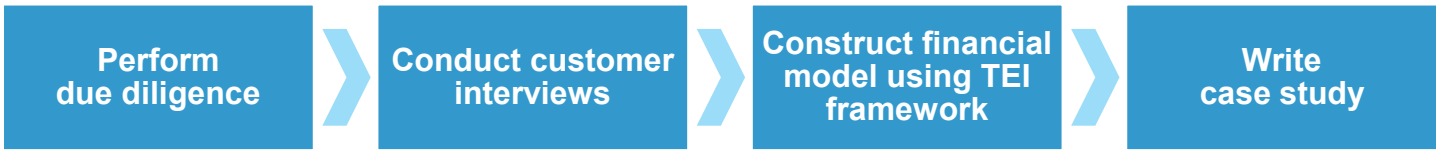
- Interviewed HP marketing and sales personnel, along with Forrester analysts, to gather data relative to HP BladeSystem with HP ProLiant BL460c Gen8 servers and the marketplace for blade servers.
- Interviewed one organization currently using HP BladeSystem with HP ProLiant BL460c Gen8 blade servers to obtain data with respect to costs, benefits, and risks.
- Constructed a financial model representative of the interview using the TEI methodology. The financial model is populated with the cost and benefit data obtained from the interview.
- Risk-adjusted the financial model based on issues and concerns the interviewed organization highlighted in interviews. Risk adjustment is a key part of the TEI methodology. While the interviewed organization provided cost and benefit information, various numbers are based on estimations. For that reason, the concerned cost and benefit totals have been risk-adjusted and are detailed in each relevant section.

Forrester employed four fundamental elements of TEI in modeling the financial impact of HP ProLiant BL460c Gen8 blade servers: 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 A for additional information on the TEI methodology.

FIGURE 2

TEI Approach



Source: Forrester Research, Inc.

Analysis

INTERVIEWED ORGANIZATION

For this study, Forrester interviewed a server and storage infrastructure manager of a financial services organization that is based in Western Europe. The company provides online trading in various fields across world markets. The company employs approximately 500 people, including 250 IT staff.

INTERVIEW HIGHLIGHTS

The interview was conducted in March 2015.

Situation

The organization used to operate a large variety of servers in three major data centers. It had a mix of rack-mounted and blade servers of different models from two different manufacturers. Six years ago, the company invested in the HP BladeSystem c7000 enclosures and the first generation of HP ProLiant BL460c blade servers. Over the years, the organization purchased more and more HP equipment and added more recent generations of the BL460c blade servers as they became available. At that point, the majority of servers in the data centers were HP ProLiant BL460c blade servers from Gen1, Gen5, Gen6, and Gen7. These servers were running anything from the core trading platforms, file and print servers, to the development platforms.

The business wanted to boost the performance of the two trading platforms and prepare the company for growth. In 2014, the organization decided to standardize the server hardware and at the same time, reduce the number of data centers from three to two.

> *"Before we standardized on HP's Gen8 blade servers, we had a lot of different servers. It required lots of different types of documents, procedures, and skill sets. It just wasn't very efficient."*
>
> ~ Server and storage infrastructure manager

Solution

The interviewed organization tested two server solutions side by side and then decided to standardize the entire server hardware on HP BladeSystem with the HP ProLiant BL460c Gen8 blade server. The main reasons for this decision include:

- The IT staff was already very familiar with HP ProLiant BL460c blade servers and HP hardware and processes in general.
- The organization liked the HP Virtual Connect feature with the FlexFabric-20/40 Module, which simplifies the configuration of the network and increases its bandwidth.
- The combination of HP BladeSystem and the HP management console, HP OneView, was seen as a powerful combination — especially for upgrading firmware, accelerating server deployments, and limiting planned downtime.
- Due to the fact that the company had used previous generations of BL460c blade servers, it had accumulated a number of spare parts, some of which might be reused.
- The organization had good business relations with HP.

The company defined four different standard server configurations: one for the trading platforms, one for file and print servers, one for SQL servers, and one for virtual hosts. These configurations had between 2 x 4 core CPUs and 2 x 10 core CPUs, between 32 GB and 256 GB of memory, and various storage capacities.

In total, the company purchased 485 HP ProLiant BL460c Gen8 blade servers and received the first batch in October 2014. The installation and deployment in the first data center was finished in mid-December. The second phase, the deployment in the second data center, was finalized at the time of the interview, in March 2015. Overall, the company removed 900 legacy servers, which were sold to a recycling company for a negligible amount.

> *"The HP ProLiant BL460c Gen8 blade servers are three times more efficient and perform three times better than what we had originally. Basically, we now deliver more with less."*
>
> ~ Server and storage infrastructure manager

Results

The interview revealed that:

- **The company reduced its server infrastructure footprint.** The organization consolidated the number of data centers from three to two and also consolidated the number of physical servers. The 485 HP ProLiant BL460c Gen8 blade servers replace a total of 900 legacy servers, which, for the most part, were previous-generation HP blade servers. This results in avoided support costs for the retired servers and a reduction in data center facility costs.
- **The consolidation also resulted in software license cost savings.** By reducing the total number of physical servers, the company was able to reduce the number of required virtual server and other operating system licenses.
- **The performance of the trading platforms was improved.** The new server infrastructure based on the HP ProLiant BL460c Gen8 blade servers has more computing power as compared with the original environment. The company reported that the overall server performance has increased by 200%. This contributed to a performance improvement of the trading platform.
- **The new standardized server environment is considered less complex and more stable.** The standardization of server hardware simplifies the server administration. Instead of administrators having to learn, execute, and maintain various procedures for each type of hardware, there is only one procedure. Documentation is also simplified. Furthermore, the company considers that the HP ProLiant Gen8 servers are generally more reliable and stable as compared with the various legacy servers that the company had previously.
- **The agentless hardware monitoring and alerting capabilities of the HP ProLiant Gen8 servers simplify troubleshooting.** The company reported that the new hardware monitoring and alerting capabilities enable the IT staff to detect and solve a number of issues even before they affect operations. These capabilities contribute to the general availability of the server infrastructure.
- **The company considers the combination of HP OneView and the new server hardware as powerful.** The organization reported that HP's management tool, HP OneView, will enable the company to speed up new deployments, simplify firmware updates, and reduce planned downtime.
- **The FlexFabric-20/40 Module increases the available bandwidth and allows for future cost savings.** Due to the increased network bandwidth, the company sees the possibility in the future to consolidate the storage network into the regular network and thus realize additional cost savings.

BENEFITS

The interviewed organization reported quantifiable benefits in terms of hardware support cost avoidance, software consolidation cost savings, simplified server administration, and reduced data center costs. Together with the interviewee, we tried to quantify these benefit categories, which are discussed below.

Another important benefit mentioned by the interviewed organization was an increase in overall performance of the trading platform. While the interviewed company understands that the HP ProLiant BL460c Gen8 servers contributed to the improved performance of the trading platform, there were many other factors that played a role in this, and the sole impact of the servers cannot be determined. It has therefore not been quantified in financial terms in this case study.

"While it is true that the performance of our trading platform was multiplied by three, it is nearly impossible to calculate any savings generated solely from using the new HP ProLiant BL460c Gen8 servers. Alongside upgrading our servers, we have also upgraded our storage arrays, computer and storage networks, the trading platform software code, and the operating systems that the trading platform runs on. All of these upgrades have increased the overall speed, efficiency, stability, and general performance of our trading platform."
~ Server and storage infrastructure manager

Avoided Hardware Support Costs

The interviewed organization was able to retire 900 legacy servers from its data centers. These legacy servers were of different types and ages. If the company had not invested in new hardware, it would have extended the hardware support. The older the hardware, the higher the support costs. For the sake of this analysis, we assume that the average annual hardware support costs per server would have been $1,000 and that the support costs increase by 25% per year.

To take into account the uncertainty of the above assumptions, this benefit was risk-adjusted and reduced by 5%. The risk-adjusted present value of the hardware support cost avoidance was $3.8 million over the four years.

TABLE 1
Avoided Hardware Support Costs

Ref.	Metric	Calculation	Year 1	Year 2	Year 3	Year 4
A1	Number of legacy servers removed	900				
A2	Assumed average annual increase in support costs	25%				
A3	Average annual hardware support costs per server	$1,000 (Year 1) increasing by 25% per year	$1,000	$1,250	$1,563	$1,953
At	Avoided hardware support costs	A1*A3	$900,000	$1,125,000	$1,406,250	$1,757,813
	Risk adjustment	↓ 5%				
Atr	Avoided hardware support costs (risk-adjusted)		**$855,000**	**$1,068,750**	**$1,335,938**	**$1,669,922**

Source: Forrester Research, Inc.

Software Consolidation Cost Savings

The consolidation of the hardware from 900 physical servers to 485 servers also had an impact on the software license costs. The interviewed organization estimates that it saves approximately $90,000 in virtual server licensing and $310,000 in other operating system licenses, as indicated in Table 2.

To take into account the uncertainty of the above assumption, this benefit was risk-adjusted and reduced by 2%. The risk-adjusted present value of the cost savings over the four years was $1.2 million.

TABLE 2
Software Consolidation Cost Savings

Ref.	Metric	Calculation	Initial	Year 1	Year 2	Year 3	Year 4
B1	Virtual server licenses cost savings			$90,000	$90,000	$90,000	$90,000
B2	Operating system cost savings			$310,000	$310,000	$310,000	$310,000
Bt	Software consolidation cost savings	B1+B2	$0	$400,000	$400,000	$400,000	$400,000
	Risk adjustment	↓ 2%					
Btr	**Software consolidation cost savings (risk-adjusted)**		**$0**	**$392,000**	**$392,000**	**$392,000**	**$392,000**

Source: Forrester Research, Inc.

Server Administration Labor Cost Savings

A number of factors enabled the interviewed organization to re-allocate the equivalent of two full-time engineers to other tasks. These include the standardization of server hardware on one single model; the consolidation from 900 to 485 physical servers; the new capabilities such as the agentless hardware monitoring and alerting; and the general higher reliability of the Gen8 servers as compared with the previous server environment. With an assumed average annual fully loaded salary rate of $110,000, the company realizes the server administration labor cost savings, as indicated in Table 3.

To take into account the uncertainty of the above assumption, this benefit was risk-adjusted and reduced by 2%. The risk-adjusted present value of the cost savings over the four years was $683,000.

TABLE 3
Server Administration Labor Cost Savings

Ref.	Metric	Calculation	Initial	Year 1	Year 2	Year 3	Year 4
C1	Number of redeployed resources (in FTEs)		0	2	2	2	2
C2	Average fully loaded annual salary	$110,000					
Ct	Server administration labor cost savings	C1*C2	$0	$220,000	$220,000	$220,000	$220,000
	Risk adjustment	↓ 2%					
Ctr	**Server administration labor cost savings (risk-adjusted)**		**$0**	**$215,600**	**$215,600**	**$215,600**	**$215,600**

Source: Forrester Research, Inc.

Data Center Facility Cost Savings

The consolidation of the server hardware also led to a reduction of data center facility costs. The interviewed organization estimates the related annual cost savings at $100,000, as indicated in Table 4.

To take into account the uncertainty of the above assumption, this benefit was risk-adjusted and reduced by 2%. The risk-adjusted present value of the data center facility cost savings over the four years was $311,000.

TABLE 4
Data Center Facility Cost Savings

Ref.	Metric	Calculation	Initial	Year 1	Year 2	Year 3	Year 4
D1	Reduced data center costs			$100,000	$100,000	$100,000	$100,000
Dt	Data center cost savings	D1	$0	$100,000	$100,000	$100,000	$100,000
	Risk adjustment	↓ 2%					
Dtr	**Data center cost savings (risk-adjusted)**		**$0**	**$98,000**	**$98,000**	**$98,000**	**$98,000**

Source: Forrester Research, Inc.

Total Benefits

Table 5 shows the total of all benefits across the four areas listed above, as well as present values (PVs) discounted at 10%. Over four years, the interviewed organization expects risk-adjusted total benefits to be a PV of approximately $6 million.

TABLE 5
Total Benefits (Risk-Adjusted)

Ref	Benefit	Initial	Year 1	Year 2	Year 3	Year 4	Total	Present Value
Atr	Avoided hardware support costs	$0	$855,000	$1,068,750	$1,335,938	$1,669,922	$4,929,609	$3,804,826
Btr	Software consolidation cost savings	$0	$392,000	$392,000	$392,000	$392,000	$1,568,000	$1,242,587
Ctr	Server administration labor cost savings	$0	$215,600	$215,600	$215,600	$215,600	$862,400	$683,423
Dtr	Data center facility cost savings	$0	$98,000	$98,000	$98,000	$98,000	$392,000	$310,647
	Total benefits	**$0**	**$1,560,600**	**$1,774,350**	**$2,041,538**	**$2,375,522**	**$7,752,009**	**$6,041,483**

Source: Forrester Research, Inc.

COSTS

This section describes and lists the incremental hardware, support, and labor costs incurred by the interviewed organization for deploying 485 HP ProLiant BL460c Gen8 blade servers within its environment.

Hardware And Support Costs

The interviewed organization invested in a total of 485 HP ProLiant BL460c Gen8 servers. The company defined four different standard server configurations: one for the trading platforms, one for file and print servers, one for SQL servers, and one for virtual hosts. These configurations had between 2 x 4 core CPUs and 2 x 10 core CPUs, between 32 GB and 256 GB of memory, and various storage capacities. The total upfront hardware costs of $4.9 million also include the hardware support for the first three years. For Year 4, we assumed an extension of the hardware support contract worth $290,000. For the interviewed organization, the present value of the hardware and support costs for four years was approximately $5.1 million.

TABLE 6
Hardware And Support Costs

Ref.	Metric	Calculation	Initial	Year 1	Year 2	Year 3	Year 4
E1	Hardware and support costs for three years		$4,900,000				
E2	Support extension for Year 4						$290,000
Etr	Hardware and support costs	E1+E2	$4,900,000	$0	$0	$0	$290,000

Source: Forrester Research, Inc.

Installation And Deployment Costs

The interviewed organization estimates the efforts of deploying the new HP ProLiant BL460c Gen8 blade servers, migrating the production workloads, and retiring the previous generation servers at approximately 300 man-days.

Nevertheless, in order to take into account the uncertainty of the above estimation, the internal labor costs were risk-adjusted up by 5%. For the interviewed organization, the total risk-adjusted labor costs were $157,500.

TABLE 7
Installation And Deployment Costs

Ref.	Metric	Calculation	Initial	Year 1	Year 2	Year 3	Year 4
F1	Labor efforts in man-days		300				
F2	Average fully loaded daily salary rate	$110,000/220 days	$500				
Ft	Installation and deployment costs	F1*F2	$150,000	$0	$0	$0	$0
	Risk adjustment	↑ 5%					
Ftr	**Installation and deployment costs (risk-adjusted)**		**$157,500**	**$0**	**$0**	**$0**	**$0**

Source: Forrester Research, Inc.

Total Costs

Table 8 shows the total of all incremental costs, as well as associated present values, discounted at 10%. Over four years, the investment represents a net present value of approximately $5.26 million for the interviewed organization.

TABLE 8
Total Costs (Risk-Adjusted)

Ref.	Cost	Initial	Year 1	Year 2	Year 3	Year 4	Total	Present Value
Etr	Hardware and support costs	$4,900,000	$0	$0	$0	$290,000	$5,190,000	$5,098,074
Ftr	Installation and deployment costs	$157,500	$0	$0	$0	$0	$157,500	$157,500
	Total costs	**$5,057,500**	**$0**	**$0**	**$0**	**$290,000**	**$5,347,500**	**$5,255,574**

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. 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 HP ProLiant BL460c Gen8 blade servers 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 A).

The interviewed organization reported that the server standardization improves the scalability of the infrastructure. The efforts and time required to grow the server infrastructure according to the business needs have been reduced by 50% or more. This will result in additional cost savings.

"We now can install a new server, configure it, deploy it, and hand it over to the business within a day — actually, within hours. Before, it probably would have taken maybe two days to do that."
~ Server and storage infrastructure manager

Furthermore, the interviewed organization identified another area for potential cost savings in the near future. Due to the introduction of the HP Virtual Connect FlexFabric modules, the company sees the opportunity of consolidating the storage network into the normal network. This will result in a reduction of support costs. The interviewee noted:

"The Fibre Channel over Ethernet (FCoE) feature that is available with the Virtual Connect 20/40 FlexFabric modules will allow us to also use the normal network infrastructure for our storage information. This way, we could remove our expensive storage network infrastructure. We have calculated that we could save between $35,000 and $40,000 per year on support costs."
~ Server and storage infrastructure manager

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 HP ProLiant BL460c Gen8 blade servers 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 HP ProLiant BL460c Gen8 blade servers, resulting in lower overall total benefits. The greater the uncertainty, the wider the potential range of outcomes for cost and benefit estimates.

TABLE 9
Benefit And Cost Risk Adjustments

Benefits	Adjustment
Avoided hardware support costs	↓ 5%
Software consolidation cost savings	↓ 2%
Server administration labor cost savings	↓ 2%
Data center facility cost savings	↓ 2%
Costs	**Adjustment**
Installation and deployment costs	↑ 5%

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 risk that affects benefits is identified as part of the analysis:

› The benefits around avoided hardware support costs, software consolidation cost savings, server administration labor cost savings, and data center facility cost savings are based on estimations that might be slightly lower than expected.

The following implementation risk that affects costs is identified as part of this analysis:

› The number of man-days required for the installation and the deployment is based on estimation and might be slightly higher.

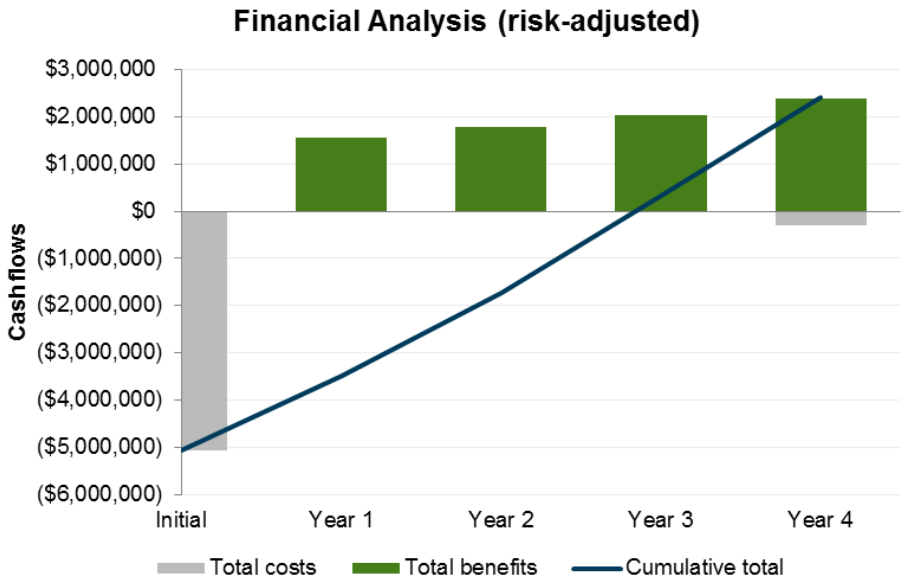
Table 9 shows the values used to adjust for risk and uncertainty in the cost and benefit estimates for the interviewed organization. Readers are urged to apply their own risk ranges based on their own degree of confidence in the cost and benefit estimates.

Financial Summary

The financial results calculated in the Benefits and Costs sections can be used to determine the ROI, NPV, and payback period for the interviewed organization's investment in HP ProLiant BL460c Gen8 blade servers.

Table 10 below shows the risk-adjusted ROI, NPV, and payback period values. These values are determined by applying the risk-adjustment values from Table 9 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 10
Cash Flow (Risk-Adjusted)

	Initial	Year 1	Year 2	Year 3	Year 4	Total	Present Value
Costs	($5,057,500)	$0	$0	$0	($290,000)	($5,347,500)	($5,255,574)
Benefits	$0	$1,560,600	$1,774,350	$2,041,538	$2,375,522	$7,752,009	$6,041,483
Net benefits	**($5,057,500)**	**$1,560,600**	**$1,774,350**	**$2,041,538**	**$2,085,522**	**$2,404,509**	**$785,909**
ROI							15%
Payback period							Within 36 months

Source: Forrester Research, Inc.

HP BladeSystem: Overview

The following information is provided by HP. Forrester has not validated any claims and does not endorse HP or its offerings.

The HP ProLiant BL460c Gen8 Server is a dual-socket server blade that comes with new and enhanced features, such as:

- Next-generation 2-socket Intel Xeon E5-2600 v2 processor family, providing up to 12 core solutions, with support for up to 130 W.
- Enhanced memory capacity and performance, along with the benefit of reduced power — 16 dual inline memory module (DIMM) slots, supporting up to 512 GB at 1600 MHz and 256 GB at 1866 MHz, with the ability to operate registered DIMMs (RDIMMs) at a low power (1.35 V) without performance reductions.
- Dual-port flexible LAN on motherboard (FlexibleLOM), which lets you choose the technology, speed, and OEM vendor of your networking ports.
- HP iLO Management Engine, with features that support the entire server life cycle, ranging from deployment to continued management, service alerts, and remote support.
- The HP P220i Smart Array controller offers three times the performance compared with the HP P410i controller that was offered with the HP ProLiant BL460c G7 Server Blade. The HP ProLiant BL460c Gen8 Server Blade offers a choice of two 2.5-inch small form factor (SFF) serial-attached SCSI (SAS), Serial ATA (SATA) drives, and solid-state drives (SSDs). The P220i Smart Array controller comes standard with 512 MB flash-backed write cache (FBWC) and supports mixing of SAS/SATA/SSD hot-plug drives.
- Two x16 PCI Express (PCIe) 3.0 I/O expansion slots, which support the highest bandwidth mezzanine option cards at present, with room for future growth.
- HP Virtual Connect 20/40 module, which consolidates external cable connections and improves manageability by allowing server blades to be added, removed, and replaced without affecting the external network, reducing both server and network management costs and streamlining operations.

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. TEI assists technology vendors in winning, serving, and retaining customers.

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 B: Glossary

Discount rate: The interest rate used in cash flow analysis to take into account the time value of money. Companies set their own 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 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 of 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 C: Supplemental Material

Related Forrester Research

"Brief: The Virtualization Conundrum — Don't Plan On Getting Rid Of Your Physical Servers," Forrester Research, Inc., December 11, 2014

"Vendor Landscape: Private Cloud Overview," Forrester Research, Inc., September 10, 2014

"Optimize Scalable Workload-Specific Infrastructure For Customer Experiences," Forrester Research, Inc., August 11, 2014

"Strategic Benchmarks 2014: Server Virtualization," Forrester Research, Inc., March 6, 2014

"Predictions For 2014: Servers And Data Centers," Forrester Research, Inc., December 19, 2013

Appendix D: Endnotes

[1] 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.