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The Total Economic Impact™ Of VMware vCenter Configuration Manager

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Executive Summary

VMware vCenter Configuration Manager was one of the assets acquired by VMware from EMC in April of 2010. Prior to the acquisition, EMC commissioned Forrester Consulting to examine the total economic impact and potential return on investment (ROI) enterprises may realize by deploying VMware® vCenter Configuration Manager (vCM), formerly EMC Ionix Server Configuration Manager (SCM). vCenter Configuration Manager automates configuration management tasks across virtual and physical server environments to increase operational efficiency and help ensure compliance with industry regulations and best practices, such as PCI DSS, SOX, HIPAA, and VMware® security best practices. This study illustrates the financial impact of implementing vCM by the operations and infrastructure groups within the Windows Server team at a large hospital and healthcare services system in the Midwest United States.

In conducting in-depth interviews with employees of a company with a VMware vCM deployment, Forrester found that the organization achieved significant labor cost savings; system administrator headcount remained steady as the company's server infrastructure grew dramatically over a period of several years. The VMware solution increased the assurance that the servers were being run in compliance with the desired configuration. Outages were reduced and operations efficiency was increased.

A year after their initial deployment of vCM, this healthcare organization began to aggressively pursue server virtualization. vCM proved to be a key tool in assisting with the drive toward virtualization, helping the company to achieve approximately 40% virtualization (so far) and a server-to-administrator ratio of 98. For some users of this study, the account of vCM as a virtualization tool might be equally or more important than the 260% ROI and fast payback period that Forrester calculated in the financial analysis described in this case study.

Configuration management tools have become popular because manually assessing and maintaining configurations is inefficient and error-prone. These problems are exacerbated with the introduction of virtualization because complexity is far worse and the dynamic movement of the virtual instances wreaks havoc without tight controls. Automated configuration tools have become a necessity to manage this dynamic complexity, thus reducing costs and ensuring more consistent, high-quality services.

Finally, vCM created a number of options for future flexibility initiatives — deploying vCM into the Unix and Linux environment, gaining value from the latest vCM capabilities, and reliance on vCM to build and migrate to a new data center. These future opportunities represent significant value in addition to the value described in the ROI analysis that represents the financial results to date.

Purpose

The purpose of this study is to provide readers with a framework to evaluate the potential financial impact of vCenter Configuration Manager 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 VMware vCenter Configuration Manager.

Methodology

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

For this study, Forrester employed four fundamental elements of TEI in modeling the ROI of vCenter Configuration Manager:

1. Costs.

2. Benefits to the entire organization.

3. Flexibility.

4. Risk.

As enterprises bring increasing sophistication to cost analyses of IT investments, Forrester's TEI methodology provides 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 four-step approach for this study.

1. Forrester gathered data from existing Forrester research relative to vCenter Configuration Manager and the server tool market in general.

2. Forrester interviewed VMware marketing and strategy personnel to fully understand the value proposition of vCenter Configuration Manager implementations.

3. Forrester conducted a series of in-depth interviews with members of the IT operations and infrastructure teams within an organization currently using vCenter Configuration Manager.

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

Key Findings

Forrester's study yielded a number of key findings:

- **ROI.** Based on the interviews with an existing VMware vCM customer, Forrester constructed a TEI framework and the associated ROI analysis illustrating the financial implications of a vCenter Configuration Manager implementation. As seen in Table 1, the risk-adjusted ROI for this company's implementation is 260% with a breakeven point (payback period) of approximately thirteen months after deployment.

- **Benefits.** The main benefit to this customer has been labor cost reduction or avoidance associated with the implementation of vCenter Configuration Manager. After implementing the product, the IT operations and infrastructure headcount remained steady despite a dramatic increase in the number of servers the teams had to manage. Total benefits over five years are estimated to be $5.4 million (or $3.5 million on a risk-adjusted, present value basis).

- **Costs.** The largest initial cost for this implementation was $682,500 for license of the product, plus $469,300 in software maintenance fees (or $879,600 in present value terms, based on standard pricing without discounts) over the period of analysis. Hardware, professional services, and internal labor amounted to approximately $84,000. Total costs

are estimated to be just over $960,000 (risk-adjusted, present value). NOTE: These costs are indicative of prices at the time of purchase; VMware currently offers additional flexibility in packaging and pricing.

Table 1 illustrates the risk-adjusted cash flow for the customer organization, based on data and characteristics obtained during the interviews. 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: ROI, Original And Risk-Adjusted

Summary financial results	Original estimate	Risk-adjusted
ROI	302%	260%
Payback period (months)	12.4	13.3
Total costs (PV)	$960,798	$963,994
Total benefits (PV)	$3,860,593	$3,474,534
Total (NPV)	$2,899,795	$2,510,540

Source: Forrester Research, Inc.

Disclosures

The reader should be aware of the following:

- The study is commissioned by the VMware in conjunction with EMC and delivered by the Forrester Consulting group.
- VMware staff reviewed and provided feedback to Forrester, but Forrester maintained editorial control over the study and its findings.
- The customer was provided by VMware.
- Forrester makes no assumptions as to the potential return on investment that other organizations will receive. Forrester strongly advises that the reader use his or her own estimates within the framework provided in the report to determine the appropriateness of an investment in vCenter Configuration Manager.
- This study is not meant to be used as a competitive product analysis.

VMware vCenter Configuration Manager: Overview

According to VMware, vCenter Configuration Manager collects, stores, remediates, and manages configuration settings from servers and workstations, across physical and virtual environments. With this critical data, vCenter Configuration Manager eliminates the complexity and expense associated with using multiple tools for managing changes, patches, configurations, remediations, and compliance. vCM provides automatic alerts when systems need to be adjusted to ensure compliance or resolve problems. The product automates common server administration tasks to increase operational efficiency, decrease costs, and increase control over IT infrastructure.

VMware vCenter Configuration Manager offers a number of capabilities, including:

- **Visibility.** Discover configurations across the IT environment and automatically track changes to them.
- **Remediation.** Detect and fix configuration problems and security vulnerabilities automatically across multiple systems.
- **Patch management.** Assess the status of patches, deploy a new patch, and verify correct deployment of a patch.
- **Compliance toolkits.** Ensure compliance with various industry and regulatory standards, best practices and requirements.
- **Scalable, secure data collection.** Discover and collect tens of thousands of configuration setting using scalable, secure architecture with minimal end point impact.
- **Multiplatform support.** Support Windows and Macintosh desktops and servers, Unix, and Linux servers, and virtualization platforms, including VMware.
- **Active Directory integration.** Manage user accounts, enforce organization standards for user accounts, and monitor changes.
- **VMware vCenter plug in**. Provides vCenter™ administrators with a single view of the depth and breadth of data including direct access to guest logs, thus helping speed problem resolution.

Analysis

Forrester took a multistep approach to evaluate the impact that implementing vCenter Configuration Manager can have on an organization:

- Interviews with VMware product marketing and strategy personnel.
- In-depth interviews with members of the IT Infrastructure and operations teams, part of the Windows Server Team, in an enterprise that is currently using vCenter Configuration Manager.
- Construction of a financial framework around the implementation of vCenter Configuration Manager.

Interview Highlights

The interviews revealed a number of valuable insights on the implementation and use of vCM within this customer organization:

- A health services and hospital system based in the Midwest was experiencing 25% to 30% annual growth in the number of physical servers under management when the decision to invest in vCM was made.
- Prior to implementing vCM, server administration was done manually or using custom scripts or ad hoc tools. The person who created a tool or script was often the only one who understood how to use it. With vCM, all tools and reports are centralized and can be run by any administrator.
- Server outages were a daily occurrence in some areas of the environment prior to deploying vCM.
- The IT teams realized that a centralized console was needed to solve a visibility problem. vCM solved that problem by providing one interface that gives all the information on all of the organization's servers — physical and virtual — such as which servers do not have backup software installed, how many copies and which versions of an application are running on which servers, what patches or service packs are installed on the servers, etc. This has been especially valuable in the company's virtualization initiatives (see page 12).
- The business case for investing in vCM was a simple one based on a comparison between the cost of adding a new tool versus the cost of adding more staff.
- Principal uses for vCM include:
    - Discovering which servers are out of compliance for OS version or patch compliance.
    - Change and policy management.
    - Security-mandated password changes. Now only a mouse click with vCM, the task could take one FTE a month to complete before vCM.
    - Monitoring disk space, server uptime, checking backups, locating noncompliance files.

  - License tracking.
  - Reporting on server metrics and statistics.
  - Identifying what software applications are installed on each server.
  - Monitoring admin and user group activities.

- vCM helps to keep track of about 400 applications from many different vendors, as well as custom applications, like different patient admissions systems or physician order entry systems for each of 18 hospital facilities.
- vCM can report against a vast amount of data (including the company's 197 GB server database), and any IT administrator can quickly create custom reports, which currently number about 130.
- Integrated with the company's server database, vCM feeds and pulls from the database for asset management data and synching data captured by vCM.
- The tool has proved invaluable for software license auditing and vendor proof purposes that show what applications (and which versions) the company has on its servers.
- Several years after the initial deployment of vCM, the company began a major drive toward server virtualization, achieving 40% virtualization at the time of this publication, with plans to significantly increase this level. vCM serves as the "tool of choice" in areas such as:
  - Viewing of the physical and virtual environments from the same console.
  - Reporting to groups and report users throughout the organization.
  - Patching of physical and virtual servers, with patch summaries from the single console.
  - Assuring virtual machine and host configuration compliance.
- The company plans to implement the latest asset management features of vCM in the near future, which will bring all of the hardware information into the single vCM interface for faster inventory management and better reporting and budgeting capabilities.
- Other future planned initiatives include bringing the company's Unix servers under vCM management, and using vCM for configuration compliance for SAN and LUN storage. Efforts in these areas were already underway when this study went to print.

TEI Framework

Introduction

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

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	Five years

Source: Forrester Research, Inc.

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

Costs

The cost categories associated with this vCenter Configuration Manager implementation are: 1) vCM software license and maintenance; 2) professional service fees for design and installation of the solution (considered optional in many cases); 3) server hardware to run the software and the console; and 4) labor costs for internal staff charged with agent deployment onto servers. The following are the cost inputs to the financial analysis.

License And Maintenance

The largest cost item in this project was the software license, which would amount to $682,500 for the implementation described in this study, based on standard pricing without any discounting. Licenses are added as needed, on a per-server basis, at a cost of $500 per server. Annual maintenance is based on 20% of the license cost, or $469,300 over the period of analysis. NOTE: These costs are indicative of prices at the time of purchase; VMware currently offers additional flexibility in packaging and pricing.

Professional Services

An implementation of this scale would be faster and more assured with the assistance of professional services from either VMare or a VMware partner. Three consultants working on-site for three days would generate a cost of about $45,000.

Hardware

Total costs for hardware and operating software in this implementation amounted to approximately $35,000. This includes a separate server (12 gig of memory, 4 CPUs, Windows Enterprise version to support 64-bit architecture) to run vCM and the console.

Internal Labor – Implementation

The IT managers who were interviewed for this study described the internal labor required to set up and launch vCM. One IT administrator (one FTE) would be required for three days. At an hourly loaded rate of $50, working on the project rollout for three days, this cost amounts to $1,200 in internal labor cost.

Ongoing labor to support vCM is minimal, estimated to be 3 hours per week, which is equivalent to .075 FTEs. Since the amount is minimal and easily rolled into the responsibilities of one or two administrators, Forrester does not include this in ongoing costs.

Total Costs

Total initial costs for this implementation are shown in Table 3 below.

Table 3: Total Costs

Costs	Initial	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Software license		243,500	112,000	127,000	100,000	100,000	682,500
Software maintenance fees		48,700	71,100	96,500	116,500	136,500	469,300
Professional services	45,000						45,000
Hardware costs	35,000						35,000
Implementation labor costs	1,200						1,200
Total	$81,200	$292,200	$183,100	$223,500	$216,500	$236,500	$1,233,000

Source: Forrester Research, Inc.

Benefits

> *"It is a sysadmin's dream tool. I can run a report and it will tell me anything I want to know about the servers, like what box is unchecked, which feature is turned off and shouldn't be, or how many licensed applications we are running, and which versions of those. We have a single interface with visibility to all of the servers' configuration settings. And it's SQL driven, which most of us understand, but there are wizards and orchestrator for those of us who don't. Some of our other tools could take a lesson in ease-of-use from [this product]."*
>
> — Senior System Administrator, Windows Server team

Initial Server Administration Support

The staff of the IT infrastructure and operations groups within the Windows Server team who were interviewed for this study described a range of benefits that their organization has gained from the use of vCM. The summary benefit described to Forrester was a major leap in the overall productivity of the Windows Server team, as measured by the server-to-administrator ratio before and after the implementation of vCM. From these metrics Forrester created the table below to measure the

amount of labor that would have been required to manage the challenging growth in the number of servers in the customer's environment.

Prior to the deployment of vCM, the server environment in this healthcare services organization was described as "chaotic" by the manager of the Windows Server team. "There was nothing to gather necessary data except custom scripts," he explained. The number of servers was growing by 30% to 35% per year. Currently the group maintains approximately 1,500 servers as of October, 2009, which includes more than 500 virtual servers and 29 hypervisor hosts to serve approximately 18,000 active users.

According to those interviewed, vCM brought order to the chaos, and allowed the organization to grow without a significant increase in headcount for server administration staff. The manager of the teams described vCM as the team's de facto tool: "It gives us whatever [server] information we need." Of the savings in staff count, this manager commented, "It's easier to justify new tools than to justify new staff." Just managing the increase in server disk space alone would require another 4 or 5 FTEs, according to interviewees. And disk space, when not managed effectively, can affect critical systems in the hospitals, like patient data backup, the transfer of patient data from one app to another, sending x-rays back to the attending physicians, etc. While most of the applications in this are not bedside systems, a few, such as EKG, colonoscopy, charting and lab work, are considered critical systems.

Notable among the tasks that vCM helps administrators to perform include:

- Reporting on available drive space, server performance metrics, admin and user group rights compliance, licenses and applications running, server OS versions and patch levels, and more than 130 custom reports.
- Server configuration compliance and any changes made to physical and virtual servers.
- Automated password changes, free of the time-consuming errors that plagued the previous manual processes.
- Validation of patching (the team uses its own custom tool to push patches to servers, but that tool has no reporting capability).
- Auditing user groups, access rights, etc. "If vCM finds someone who is not supposed to be there, they get taken out."
- Assuring certain network card features are always either turned on or off, according to configuration policy and optimization criteria.
- Making sure the right services are running on each server.

Information collected and reported via vCM enables an understanding of instant current state — for example, gathering all the version numbers of all backup software on every server prior to an upgrade. Having this instant current state available saves a great deal of time and effort. Previously a full day was needed to manually collect this same data. Another example of time savings and administrator productivity enhancement is migrating users from one file server to a closer one when they move to another hospital facility. By running a custom vCM report, administrators can quickly identify the users who would see better performance by moving to another server and quickly point those users to their new home servers.

An Aid In Virtualization

> "*With vCM, we have quick and organized access to a unified view of the physical and virtual environments. The Security team is now requesting security reports around the server configurations, and vCM is the tool of choice to make VMs and hosts compliant with security requirements."*
>
> — Senior Administrator , Windows Server Team

Faced with insufficient power for their growing server environment, this company began virtualization initiatives (in Year 2 of the financial framework) to alleviate the power shortage problem. When this study was completed, the company had achieved 40% virtualization of its server environment, although the virtualization story continues with additional plans for aggressive virtualization in preparation for a major data center migration and consolidation project. Currently, every new server must be considered for virtualization and there must be specific justification if the new server is not virtualized. Further, the company is now using virtualization for critical applications such as records scanning and their Web servers.

At the time of this study, the company had 29 VMware ESX® hosts, each running 15 to 20 virtual machines (VM), for a total of nearly 500 virtual machines. The 29 ESX servers employ eight different builds, which presents yet another layer of management complexity, especially insofar as the VMs are typically installed manually, making build consistency a challenge. Dual core machines predominate in this environment, along with an increasing number of virtual Linux VMs.

"When we started virtualizing", explained the manager of the Server team, "there was no tool out there that could give us all the information on all the servers. It was all manual effort. When vCM came out with support for ESX that helped us. For example, how many ESX hosts have certain functionality turned on? Before, we had to answer that question manually." Another IT manager interviewed by Forrester explained, "With vCM, we have quick and organized access to a unified view of the physical and virtual environments."

vCM provides a single interface for this healthcare organization to obtain information on all of its servers — both physical and virtual. IT organization can get detailed information on virtual and physical server configurations (two of the most important sources of configuration issues) — and what has changed with those configuration — readily available on one interface.

The key areas where VMware vCM supports the organization's virtualized server environment include:

Reporting

- vCM manages all hosts (physical or virtual) and VM guests from a single console.
- The customer makes significant use of vCM's reporting capabilities. These reports are also helpful to people in other areas of the company, such as Engineering, the Operations team, and the VM team who need information but should not have access to server configuration and change tools.

Compliance with configuration security requirements (virtual and physical)

- The customer utilizes vCM's out-of-the-box compliance tool kits for VMware security best practices. "The Security team is now requesting security reports around the server

configurations, and vCM is the tool of choice to make VMs and hosts compliant with security requirements," noted one IT manager.

Patching

- This IT organization regularly patches their servers, which can be a daunting task in virtual environments. Virtualization represents an accelerant in complexity that renders many manual tasks like patching very challenging. Without an effective tool like vCM, poor use of virtual and physical resources and hidden failure points can result. The vCM console also provides a patch summary of the VMs.

If not for the boost in administrative productivity, the company would have had to hire more IT administrators. Yet doing so would not have provided the efficiencies nor increased speed of response that resulted from the implementation of vCM.

Table 4 presents the calculations of the value of vCM in terms of labor costs avoided, based on the server-to-administrator ratios that were recorded and reported to senior management at this healthcare services organization. The figures shown on Line E7 are the numbers of administrative FTEs that would have been required without the implementation of vCM. Some of the benefit shown has resulted from other tools deployed at the same time, and thus Forrester attributes only 75% of the overall benefit amounts to vCM, based on the customer's own estimates.

Table 4: Server Administration Efficiency Improvement

Ref.	Metric	Notes/calculation	Year 1	Year 2	Year 3	Year 4	Year 5	Total
E1	Number of servers	Baseline: 200 servers	487	711	965	1,165	1,365	
	% Virtualized / # VMs			10% / 70	20% / 190	30% / 350	40% / 550	
E2	Administrators employed	Baseline: 11 admin	14	13	14	14	14	
E3	**Servers per administrator**		**35**	**55**	**69**	**83**	**98**	
E4	Admins per server w/o vCM, other tools	Baseline: 20 admins / server	24.0	26.4	29.0	31.9	35.1	
E5	Administrators required w/o vCM, other tools	E1/E4	20.3	26.9	33.2	36.5	38.8	
E6	Percent gain attributed to vCM vs. other tools	Customer est.	75%					
E7	Delta: number of FTE administrators not added due to vCM	(E5 - E2) * E6	4.7	10.4	14.4	16.9	18.6	
E8	Fully loaded compensation	$75,000, 4% annual incr.	$75,000	$78,000	$81,120	$84,365	$87,739	
Et	Server administration efficiency gain	E7 * E8	$353,906	$815,011	$1,169,955	$1,421,762	$1,635,005	$5,395,640

Source: Forrester Research, Inc.

IT Team Agility

When resources are not dedicated to as many administrative tasks, and when teams are small and well-managed compared with "admin sprawl" in a less tool-intensive IT environment, the IT department can address more strategic projects and business-supporting initiatives. This was the case in which three staff from the Infrastructure and Operations groups were able to assist with the implementation of a new computerized physician order entry (CPOE) system, including 40 physical, 40 virtual, 15 open source servers in less than nine months. Interviewees claimed that the project would not have been possible if not for vCM relieving the team of more mundane administrative work.

Total Benefits

Table 5 summarizes the benefits — avoiding the addition of IT staff due to efficiencies gained in server task automation, reporting, and configuration assurance, and assistance across the virtualized environment — experienced by this VMware vCM customer from implementing vCenter Configuration Manager.

Table 5: Total Benefits

Benefits	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Server administration efficiency improvement	353,906	815,011	1,169,955	1,421,762	1,635,005	5,395,640
Total	$353,906	$815,011	$1,169,955	$1,421,762	$1,635,005	$5,395,640

Source: Forrester Research, Inc.

Risk

Risk is the third component within the TEI model; it is used as a filter to capture the uncertainty surrounding different cost and benefit estimates. If a risk-adjusted ROI still demonstrates a compelling business case, it raises confidence that the investment is likely to succeed because the risks that threaten the project have been taken into consideration and quantified. The risk-adjusted numbers should be taken as "realistic" expectations, since they represent the expected values considering risk. In general, risks affect costs by raising the original estimates and alter benefits by reducing the original estimates.

For the purpose of this analysis, Forrester risk-adjusts certain 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, in the case of the benefit calculations for improvement in server administration efficiency, the server-per-administrator values shown in Table 4 above can be considered the "most likely" value. This benefit will vary based on several factors, including the overall technical success of the implementation as well as technical factors that are difficult or impossible to forecast before putting vCM into production. This variability represents a risk that is captured as part of this study. Forrester uses a risk-adjustment factor of 120% of the original estimates on the high end, 100% as the most likely, and 50% of the original estimate on the low end. This has the effect of decreasing the benefit estimate to take into account the fact that original benefit estimates could very well be

revised downward. Forrester then creates a triangular distribution to reflect the range of expected benefit, with 90% as the mean (equal to the sum of 120%, 100%, and 50%, divided by three). Forrester applies this mean to the number of IT administration staff "replaced" by vCM, which is then multiplied by an average annual fully loaded compensation rate of $75,000 to arrive at the risk-adjusted value in each year depicted in the analysis.

The following tables show the values used to adjust for uncertainty in cost and benefit estimates. Different costs and benefits estimates have different levels of risk adjustments. Readers are urged to apply their own risk ranges based upon their own degrees of confidence in the cost and benefit estimates.

The table below shows the risk-adjustment factors used for this financial framework:

Table 6: Risk Adjustment Factors

Risk adjustment factors	Low	Most likely	High	Mean
Implementation labor costs	100%	100%	200%	133%
Hardware costs	100%	100%	125%	108%
Server administration efficiency improvement	50%	100%	120%	90%

Source: Forrester Research, Inc.

Flexibility

Flexibility, as defined by Forrester's TEI methodology, represents an investment in additional capacity or capability today that could be turned into future business benefits for some future additional cost. 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 vCenter Configuration Manager for a focused purpose and later discover additional uses and/or activate additional functionality inherent in the tool, such as its compliance toolkits. The flexibility to subsequently deploy vCenter Configuration Manager in other business areas and/or create additional value from the same data sources has quantifiable value.

One such option involves expanding use of vCenter Configuration Manager by rolling out the tool to the Unix/Linux servers, an initiative currently under consideration by this customer's IT decision-makers. The initial investment in vCenter Configuration Manager created the "option" to more cost-effectively implement similar functionality for a greater portion of the company's server environment, thus capitalizing on the learning curve gained in the initial implementation of vCenter Configuration Manager for Windows servers. To quantify this option, Forrester assembled a set of assumptions based on expanding vCenter Configuration Manager use so that it would be used to manage 400 Unix servers.

The flexibility component of TEI captures this value using the financial industry standard Black-Scholes option pricing model. Forrester calculated the value of this flexibility option to arrive at a value of approximately $1.3 million, based on assumptions similar to those used to calculate benefits and costs in Tables 3 and 4. For the sake of clarity and because flexibility option value is highly variable for each customer, Forrester has not included the value of this option in the ROI

calculations demonstrated throughout this study. This value exists in addition to risk-adjusted benefits described in this analysis.

Table 7: Valuation Of Flexibility Option — Rollout to All Unix Servers

	Metric	Calculation	Value
A1	Asset value (benefit)	Based on 6 administrators replaced / avoided	$1,500,000
A2	Cost to acquire option	vCM licenses, annual maintenance	$223,000
A3	Expiration (time to expire, in years)		3.0
At	Flexibility	Black-Scholes option pricing model	$1,300,000

Source: Forrester Research, Inc.

Indeed, the Windows and Directory team is currently planning to bring their Unix/Linux servers under vCM management. This is an illustration of one flexibility option as described by this customer. There are other flexibility options, described to Forrester during interviews for this study, including:

- **Aid for a new data center**. The customer plans to build a new $30 million data center, which will be their primary data center and virtualization is key to the success of the transition and deployment. The virtualization accomplished up to the time the new DC opens will greatly facilitate the migration and consolidation to the new data center.

- **Aid for virtual Linux server environment.** Because this organization is using more and more virtual Linux servers, vCM will help the Linux team to use a familiar tool to obtain information from Linux guests and provide reports to the Linux/UNIX team.

- **Utilizing the vCM asset management tool.** This added functionality will be valuable for bringing hardware inventory into the single vCM interface to manage to view, for example, all pieces of hardware by stage in the life cycle, and more efficiently trim end-of-life (and thus riskier) assets. This will save at least two days per month in data gathering, analysis, and report generation.

- **Integrating the Active Directory tool.** Currently, the company uses a separate interface for managing Active Directory. The tool would be expected to save .50 to .75 FTE.

- **Using vCM data to feed the change management database (CMDB).** This could provide value that would otherwise require another 2 FTEs to manage the same data for change management, compliance, and systems monitoring.

- **Using vCM for configuration compliance for SAN and LUN storage.** Efforts in this area are already underway.

- **Implementing the latest version of vCM (5.2)**. In the next few months, the customer plans to upgrade to the newest version of vCM, which will provide a vCenter plugin to enable the VMware team to access vCM information by clicking on tabs right in the familiar vCenter console (without having to use unfamiliar interfaces or programs).

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, flexibility, and risk sections using the representative numbers are used to determine a return on investment, net present value, and payback period.

Tables 8 and 9 show the risk-adjusted values after applying the risk-adjustment method indicated in the "Risks" section.

It is important to note that values used throughout the TEI Framework are based on in-depth interviews with a selected EMC customer. 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 vCenter Configuration Manager.

Table 8: Total Risk-Adjusted Costs

Costs	Initial	Year 1	Year 2	Year 3	Year 4	Year 5	Total	Present Value
Software license		243,500	112,000	127,000	100,000	100,000	682,500	539,736
Software maintenance fees		48,700	71,100	96,500	116,500	136,500	469,300	339,862
Professional services	45,000						45,000	45,000
Hardware costs	37,800						37,800	37,800
Implementation labor costs	1,596						1,596	1,596
Total	$84,396	$292,200	$183,100	$223,500	$216,500	$236,500	$1,236,196	$963,994

Source: Forrester Research, Inc.

Table 9: Total Risk-Adjusted Benefits

Benefits	Year 1	Year 2	Year 3	Year 4	Year 5	Total	Present Value
Server administration efficiency improvement	318,516	733,510	1,052,959	1,279,586	1,471,505	4,856,076	3,474,534
Total	$318,516	$733,510	$1,052,959	$1,279,586	$1,471,505	$4,856,076	$3,474,534

Source: Forrester Research, Inc.

Study Conclusions

Forrester's in-depth interviews with this vCM customer yielded several important observations. Based on information collected in interviews, Forrester found that organizations can realize benefits in the form of significant productivity gains and resulting cost savings for IT administration as a result of automating server configuration management. vCenter Configuration Manager enabled this customer's IT departments to reduce complexity and expense of managing changes, verifying patches, and assuring compliance across physical and virtual environments.

By automating server administration tasks, the IT teams increased operational efficiency, decreased costs, and increased their control over the hospitals' IT infrastructure.

The financial analysis provided in this study illustrates the process for an organization to evaluate the value proposition of vCenter Configuration Manager in its environment. Based on information collected in the customer interviews, Forrester calculated a risk-adjusted ROI of 260% for this customer with a payback period of approximately 13 months. All final estimates are risk-adjusted to incorporate potential uncertainty in the calculation of costs and benefits.

In addition to the value described in the ROI calculations, this study uncovered flexibility, or options for next-step projects that can generate value to this customer organization in the future, based on the investment in vCM that has already been made.

Based on these findings, companies looking to implement vCenter Configuration Manager can see large productivity benefits and significant cost savings. Using the TEI framework, many companies may find the potential for a compelling business case to make such an investment.

Table 10: ROI, Original And Risk-Adjusted

Summary financial results	Original estimate	Risk-adjusted
ROI	302%	260%
Payback period (months)	12.4	13.3
Total costs (PV)	$960,798	$963,994
Total benefits (PV)	$3,860,593	$3,474,534
Total (NPV)	$2,899,795	$2,510,540

Source: Forrester Research, Inc.

Appendix A: Total Economic Impact Overview

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

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 environments.

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. 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 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 one through three 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 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, flexibility, and risk 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, where he specialized in business value justification of technology investments and customer advocacy. 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.