The Total Economic Impact™ Of VMware End User Computing

Cost Savings And Business Benefits Enabled By VMware Horizon

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Table Of Contents

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ABOUT FORRESTER CONSULTING

Forrester Consulting provides independent and objective research-based consulting to help leaders succeed in their organizations. Ranging in scope from a short strategy session to custom projects, Forrester's Consulting services connect you directly with research analysts who apply expert insight to your specific business challenges. For more information, visit forrester.com/consulting.

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Benefits Overview

End user time savings:
$1,018,832

Reduction in hardware and software spend:
$2,716,886

Recycled cloud compute savings:
$11,260,257

IT headcount avoidance:
$2,999,262

Executive Summary

VMware Horizon is an end user computing solution that provides users access to all their virtual desktops and applications through a single digital workspace. By coupling VMware Horizon with vSphere, organizations can virtualize their end user computing environment — providing a better end user experience while reducing their infrastructure demands and recognizing further hybrid cloud savings.

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

To better understand the benefits, costs, and risks associated with this investment, Forrester interviewed one customer with several years of experience using Horizon. Prior to using Horizon, the customer used an alternative virtual desktop solution run on top of the VMware vSphere hypervisor.

The interviewed organization found that running a hybrid environment did not afford it the benefits that a single vendor relationship would. In addition to reduced software costs, the organization could combine its VMware hypervisor with Horizon to provide a better end user experience, recognize efficiencies in its IT administration duties, extend hardware lifespans, and reduce on-demand compute costs.

Key Findings

Quantified benefits. The interviewed organization experienced the following risk-adjusted present value (PV) quantified benefits:

› **End user time savings valued at $1.02 million.** The organization saved contact-center workers 15 minutes per day with Horizon's persistent desktop experience. Before the organization provisioned virtual desktops with Horizon, workers in the contact center spent time each day customizing their desktops for optimal workflow.

› **Reduction in hardware and software spend of $2.72 million.** With a fully virtualized environment, the organization could extend the lifespan of its data-center hardware from three to five years and avoid costly refreshes. By streamlining vendor contracts, the organization saved an additional $500,000 per year on end user computing software.

› **Recycled cloud compute savings of $11.26 million.** The organization harvested compute power from un- or underused virtual desktops and applied it to high-compute processes carried out within the organization. Drawing on existing virtual desktop infrastructure (VDI) rather than purchasing additional compute from public cloud providers during high-demand periods saved the organization over $4 million per year.

› **IT headcount avoidance valued at $3.00 million.** Using Horizon enabled the organization to streamline the management of end user devices — provisioning, updating, problem solving, and retiring — resulting in larger ratio of employees supported by each IT member.

Unquantified benefits. The interviewed organization experienced the following benefits, which are not quantified for this study:

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ROI
152%

Benefits PV
$18.0 million
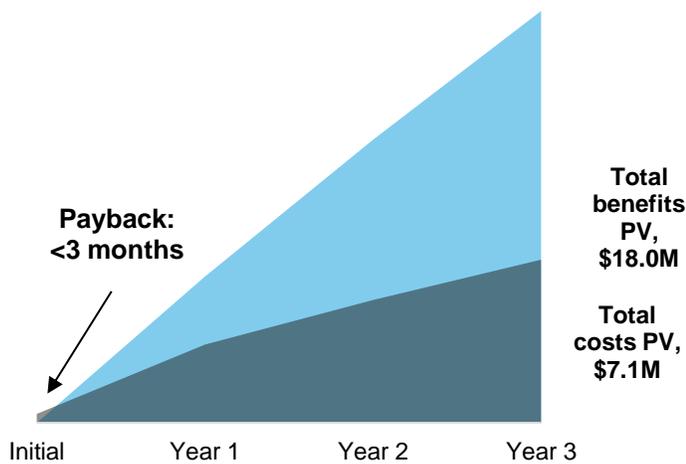
NPV
$10.9 million

Payback
< 3 months

› **Workforce time savings from lost, forgotten, or nonworking devices.** If an employee lost or forgot their device at home, the organization could provide them with one of the many kept on hand internally. With persistent virtual desktops, the employee would be able to access all files and applications they had previously been using.

› **Improved security.** With a completely virtualized environment, the organization attained a better view into the health and security of connected devices. The organization was able to easily swap out and fix compromised devices without interrupting the workflow of users. The organization also recognized added security benefits of NSX (network virtualization) — providing the organization with an additional firewall.

› **Improved employee experience.** The organization could optimize and provide a more consistent experience for all its users across devices. Employees could use the devices of their choosing and access their files and applications remotely.

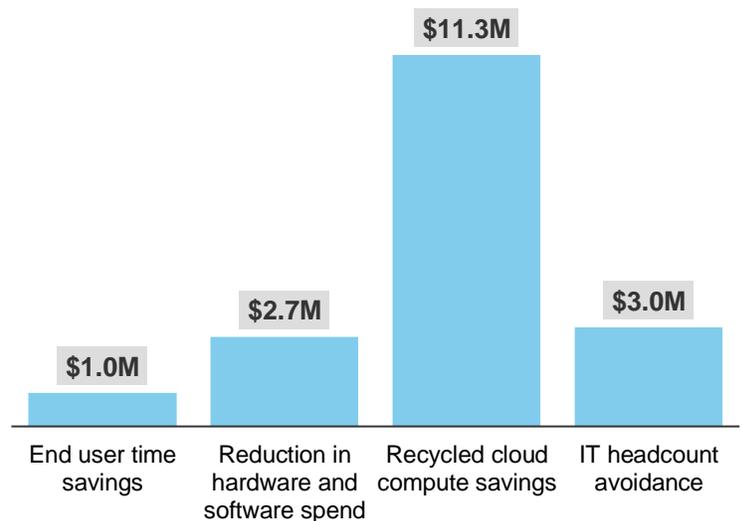**Costs.** The interviewed organization experienced the following risk-adjusted PV costs:

› **Fees paid to VMware valued at $1.2 million.** The organization paid for upfront implementation consulting as well as ongoing licensing for use of VMware Horizon.

› **Implementation, training, and change-over costs of $436K.** The organization incurred internal costs for the implementation of Horizon, migration of adjacent tools, and the training of its admin and engineering teams.

› **Ongoing internal costs of $5.48 million.** The organization incurs infrastructure costs to run its VDI environment and staffs a team of five FTEs to manage its end user computing ecosystem.

Forrester's interview with an existing customer and subsequent financial analysis found that the interviewed organization experienced benefits of $17,995,237 over three years versus costs of $7,128,282, adding up to a net present value (NPV) of $10,866,955 and an ROI of 152%.

Financial Summary

Payback: <3 months

Total benefits PV, $18.0M

Total costs PV, $7.1M

Initial   Year 1   Year 2   Year 3

Benefits (Three-Year)

$1.0M — End user time savings

$2.7M — Reduction in hardware and software spend

$11.3M — Recycled cloud compute savings

$3.0M — IT headcount avoidance

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TEI Framework And Methodology

From the information provided in the interview, Forrester has constructed a Total Economic Impact™ (TEI) framework for those organizations considering implementing VMware Horizon.

The objective of the framework is to identify the cost, benefit, flexibility, and risk factors that affect the investment decision. Forrester took a multistep approach to evaluate the impact that VMware Horizon can have on an organization:

DUE DILIGENCE
Interviewed VMware stakeholders and Forrester analysts to gather data relative to Horizon.

CUSTOMER INTERVIEW
Interviewed one organization using Horizon to obtain data with respect to costs, benefits, and risks.

FINANCIAL MODEL FRAMEWORK
Constructed a financial model representative of the interview using the TEI methodology and risk-adjusted the financial model based on issues and concerns of the interviewed organization.

CASE STUDY
Employed four fundamental elements of TEI in modeling VMware Horizon's impact: 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.

> The TEI methodology helps companies demonstrate, justify, and realize the tangible value of IT initiatives to both senior management and other key business stakeholders.

DISCLOSURES

Readers should be aware of the following:

This study is commissioned by VMware 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 VMware Horizon.

VMware 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.

VMware provided the customer name for the interview but did not participate in the interview.

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The End User Computing Customer Journey

BEFORE AND AFTER THE END USER COMPUTING INVESTMENT

Interviewed Organization

For this study, Forrester interviewed an existing VMware customer:

› Provides financial services and products in the United States. The organization has over $200 billion in assets under management.

› Employs roughly 4,300 end users, supported by an IT team of 31 people. Each end user has a virtual desktop, and the organization maintains an additional 100 virtual desktops for legacy users or additional workloads.

› Uses VMware to provision and manage its virtual desktop infrastructure.

› Previously had a mixed ecosystem of remote desktop and virtual infrastructure tools but consolidated and migrated its environment to VMware.

Key Challenges

The organization faced key productivity, functionality, and cost issues:

› **Providing a consistent and high-quality experience across devices.** The organization aimed to provide every user with a consistent experience with the highest-quality features regardless of device or location. The VP of IT client services said: "Our drive is to provide a better environment than you can get from the device you have. We have users who use their phone and then we have people who use [tablets] or they're on personal laptops. It's more about how we enable an end user to use pretty much any device to compute anywhere at any time."

› **Simplifying vendor ecosystem and recognizing cost efficiencies.** Prior to implementing Horizon, the organization ran an alternative virtual desktop solution on top of its VMware hypervisor. Using multiple vendors reduced its ability to recognize cost efficiencies and product synergies.

› **Lowering costs to support variable high-compute workloads.** The organization had variable demands for high-compute workloads, on top of its predictable baseline workloads. During peak usage periods, the organization would have to purchase on-demand compute to supplement its on-premise resources.

Key Results

The interview revealed several key results from the Horizon investment. VMware Horizon:

› **Provided a consistent user experience across all devices.** With Horizon, the organization enabled its workforce to access their applications and files from the devices of their choosing. With a completely virtual environment, the organization was able to cost-effectively optimize user experience across the organization with features such as 4K streaming support.

> "Our drive is to provide a better environment than you can get from the device you have. We have users who use their phone, and then we have people who use [tablets] or they're on personal laptops. It's more about how we enable an end user to use pretty much any device to compute anywhere at any time."
>
> *VP of IT client services, financial services*

> "We provide a desktop that is very, very fast and very, very reliable. Now, if you come to work and you walk up several flights of stairs and you drop your laptop off the stairs, you can go back to the help desk, take out a preconfigured, prepatched, ready-to-go laptop, take it back to your desk, plug back in, and when you log back on, can be in the same spreadsheet, in the same spot that you were before you dropped your laptop off the stairs."
>
> *VP of IT client services, financial services*

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› **Simplified vendor management.** By migrating to a fully VMware-virtualized environment, the organization streamlined its vendor management and recognized the cost efficiencies of dealing with a single provider. Paying for a single, streamlined environment allowed the organization to save $500,000 per year. The interviewee stated: "If I need something that's going to monitor the servers, right — the hypervisor-level side of the servers and all the things that sit on those — I need something equivalent to VMware vRealize Operations. If I need something that's going to enable the separation of all of those, I need something equivalent to NSX. More so, if I need, and this is where most of the cost was, a good quality desktop experience, I need something equivalent to Horizon, and I need it for thousands of machines. I now get that all bundled."

› **Simplified IT management.** The organization reduced its mean-time-to-resolution and maintained a support staff at a 300-to-1 ratio. Prior to using Horizon, the organization experienced a longer ticket queue and required more support staff due to its virtual desktop solution having poorer reliability, with a support staff ratio of 140 to 1.

› **Extended hardware lifespan.** The organization was able to stretch the planned lifespan of its servers from three to five years with its fully virtualized environment. With virtualization, the organization could consolidate and optimize its server environment, reducing refreshes and the scale of hardware additions to meet increasing compute demand.

› **Harvested unused VDI compute power.** The organization harvested compute power from underutilized VDI desktops and redirected it toward high-compute workloads, which had exceeded their provisioned computing power. By redirecting this unused compute power, the organization avoided purchasing on-demand compute from public cloud providers during peak periods.

"We were able to consolidate all our disparate tools we had to piece together to get the same functionality. We're able to bundle it together with one VMware package, and not only receive them in the same environment, but they also cost half a million dollars less a year."

VP of IT client services, financial services

"Our goal is not to provide a desktop; it's to make the end user more productive. It's to deliver on a request when they ask for it. To get them back up and running anytime they need a resolution quickly and to provide a desktop that is super responsive."

VP of IT client services, financial services

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Analysis Of Benefits

QUANTIFIED BENEFIT DATA

Total Benefits

REF.	BENEFIT	YEAR 1	YEAR 2	YEAR 3	TOTAL	PRESENT VALUE
Atr	End user time savings	$409,688	$409,688	$409,688	$1,229,063	$1,018,832
Btr	Reduction in hardware and software spend	$1,092,500	$1,092,500	$1,092,500	$3,277,500	$2,716,886
Ctr	Recycled cloud compute savings	$4,322,250	$4,538,363	$4,765,281	$13,625,893	$11,260,257
Dtr	IT headcount avoidance	$1,206,048	$1,206,048	$1,206,048	$3,618,143	$2,999,262
	Total benefits (risk-adjusted)	$7,030,485	$7,246,598	$7,473,516	$21,750,598	$17,995,237

End User Time Savings

Horizon created a consistent desktop experience for users across devices. Users within the contact center could flexibly work at any workstation and access their own customized desktops. Prior to implementing Horizon, users in the organization's call center spent an average of 15 minutes per day setting up and customizing their desktops to maximize the efficiency of their daily tasks.

The VP of IT client services said: "The call center was taking 15 minutes a day to get ready when they projected apps, instead of a full desktop. When they would log in in the morning, they had to reassociate where they were on their screens. Because once they get started, they want to be moving as fast as they can. This isn't a slow-paced environment; these people are trying to move as fast as they can, so they want everything in the exact right spots on their screen. Once we got them on persistent, it's their own desktop, persistent desktops. They come in in the morning, and everything is exactly where they left it the day before."

Forrester has modeled this benefit using the following calculations and assumptions:

› Each of the 400 call-center employees earn an average fully burdened annual compensation of $46,000.

› The call center is open standard working days and hours.

› A portion of the time saved is not spent on productive work. It is assumed that workers redirect 75% of their saved time toward work activities.

Forrester recognizes that these results may not be representative of all experiences, and certain factors may limit the benefits gained for an organization. Specific risk considerations include:

› Size and scope of call-center operations.

To account for these risks, Forrester adjusted this benefit downward by 5%, yielding a three-year risk-adjusted total PV of $1,018,832.

The table above shows the total of all benefits across the areas listed below, as well as present values (PVs) discounted at 10%. Over three years, the interviewed organization expects risk-adjusted total benefits to be a PV of nearly $18.0 million.

6%

$1.0 million

three-year benefit PV
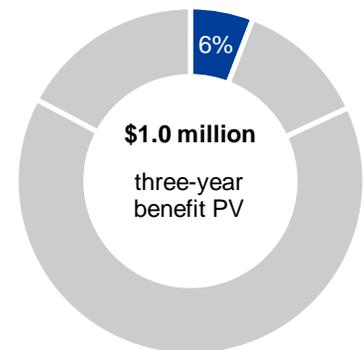
End user time savings: 6% of total benefits

Impact risk is the risk that the business or technology needs of the organization may not be met by the investment, resulting in lower overall total benefits. The greater the uncertainty, the wider the potential range of outcomes for benefit estimates.

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End User Time Savings: Calculation Table

REF.	METRIC	CALC.	YEAR 1	YEAR 2	YEAR 3
A1	Users in contact center		400	400	400
A2	Minutes saved per day with persistent desktop		15	15	15
A3	Working days per year		260	260	260
A4	Annual hours saved	A1*(A2/60)*A3	26,000	26,000	26,000
A5	Productivity recapture		75%	75%	75%
A6	Productive hours saved	A4*A5	19,500	19,500	19,500
A7	Average fully burdened call center salary		$46,000	$46,000	$46,000
At	End user time savings	(A7/2,080)*A6	$431,250	$431,250	$431,250
	Risk adjustment	↓5%			
Atr	End user time savings (risk-adjusted)		$409,688	$409,688	$409,688

Reduction In Hardware And Software Spend

The interviewed organization operates dual replicated data centers, both operating at 50% capacity. The organization's data centers house a total of 500 blade servers, providing 11,000 total cores. Implementing Horizon was a key step in creating a virtualized environment with streamlined vendor management for the interviewed organization. Moving to a full VMware buildout with Horizon and vSphere facilitated the organization in moving from a three-year to five-year lifespan for its data-center hardware.

Furthermore, consolidating its software needs to a single vendor allowed the organization to recognize the cost benefits on bundled pricing, reducing its annual software spend by $500,000.

Forrester assumes that the composite organization:

› Has servers valued at an average of $10,000.

› Normally refreshes 33% of its hardware due to failure or age in any given year.

The reduction in hardware and software spend will vary with:

› Organizational demands and corresponding hardware types.

› Organizational policies regarding hardware useful life.

› Size of existing software vendor portfolio.

To account for these risks, Forrester adjusted this benefit downward by 5%, yielding a three-year risk-adjusted total PV of $2,716,886.

15%

$2.7 million

three-year benefit PV
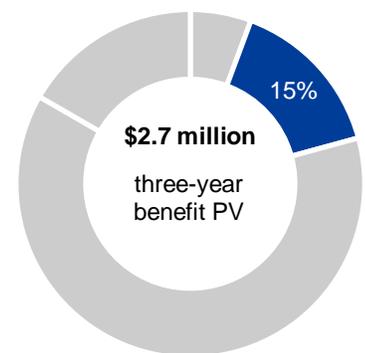
Reduction in hardware and software spend: **15%** of total benefits

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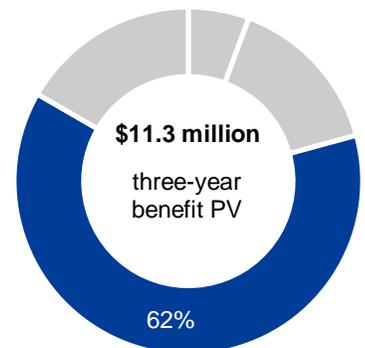| REF.	METRIC	CALC.	YEAR 1	YEAR 2	YEAR 3
	Reduction In Hardware And Software Spend: Calculation Table				
B1	Blade servers		500	500	500
B2	Cost per server		$10,000	$10,000	$10,000
B3	Total capital value of server farm	B1*B2	$5,000,000	$5,000,000	$5,000,000
B4	Normal hardware refresh	B3*33%	$1,650,000	$1,650,000	$1,650,000
B5	Refresh with extended lifespan	B3*20%	$1,000,000	$1,000,000	$1,000,000
B6	Reduced refresh costs	B4-B5	$650,000	$650,000	$650,000
B7	Reduced software spending	B1*$1,000	$500,000	$500,000	$500,000
Bt	Reduction in hardware and software spend	B6+B7	$1,150,000	$1,150,000	$1,150,000
	Risk adjustment	↓5%			
Btr	Reduction in hardware and software spend (risk-adiusted)		$1,092,500	$1,092,500	$1,092,500

Recycled Cloud Compute Savings

The interviewed organization used the built-in vSphere capabilities to engineer a cycle-harvesting platform for its VDI environment. When end users back off their virtual machines, or go idle, the organization is able to redirect the unused computing power toward other high-performance workloads. By using a combination of Horizon and vSphere, the organization avoided installing a local client on each virtual machine, thereby causing no interruptions or noticeable changes in performance for its end users.

› The organization took compute power from workers performing low-intensity tasks and reallocated it to departments with high-compute demands, such as those running actuarial algorithms.

› By using internally sourced compute power, the organization avoided turning to on-demand public cloud providers during periods of peak demand.

› The organization was able to recycle and avoid purchasing over 28 million core hours in the first year.

Forrester has modeled this benefit using the following calculations and assumptions:

› Core hour usage grows by 5% annually as the organization invests in more sophisticated business operations.

› The average core hour price is $0.17.

Forrester recognizes that these results may not be representative of all experiences, and benefits will vary based on developer skills and expertise. To account for these risks, Forrester adjusted this benefit downward by 10%, yielding a three-year risk-adjusted total PV of $11,260,257.

$11.3 million
three-year benefit PV

62%

Recycled cloud compute savings: **62%** of total benefits

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Recycled Cloud Compute Savings: Calculation Table

REF.	METRIC	CALC.	YEAR 1	YEAR 2	YEAR 3
C1	Core hours recycled	Assumption 5% annual growth	28,250,000	29,662,500	31,145,625
C2	Price per core hour	Assumption	$0.17	$0.17	$0.17
Ct	Recycled cloud compute savings	C1*C2	$4,802,500	$5,042,625	$5,294,756
	Risk adjustment	↓10%			
Ctr	Recycled cloud compute savings (risk-adjusted)		$4,322,250	$4,538,363	$4,765,281

IT Headcount Avoidance

Having a virtual desktop environment aided the organization in maximizing the efficiency of its IT team. IT workers could easily swap out issue devices and push upgrades and patches overnight without interfering with end users' work. Furthermore, the organization could staff IT workers across multiple time zones to better accommodate requests.

The interviewed organization greatly improved its support ratio from 140-to-1 to 300-to-1 and avoided hiring additional IT staff to support its end users.

Forrester has modeled this benefit using the following calculations and assumptions:

› Average fully burdened IT help desk compensation of $77,000.

Forrester recognizes that certain factors may limit the benefits experienced by an organization. Specific risk considerations are:

› Size, scope, and complexity of operations.

› Training, specializations, and skill sets of existing IT workforce.

To account for these risks, Forrester adjusted this benefit downward by 5%, yielding a three-year risk-adjusted total PV of $2,999,262.

17%

$3.0 million

three-year benefit PV
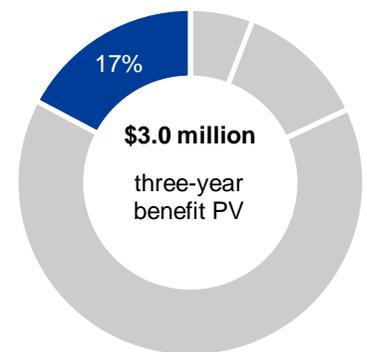
IT headcount avoidance:
17% of total benefits

IT Headcount Savings: Calculation Table

REF.	METRIC	CALC.	YEAR 1	YEAR 2	YEAR 3
D1	Total end users		4,300	4,300	4,300
D2	Ratio of end users per IT help desk worker without VMware		140	140	140
D3	Ratio of end users per IT help desk worker with VMware		300	300	300
D4	Reduced IT FTE demand	(D1/D2)-(D1/D3)	16.38	16.38	16.38
D5	Average fully burdened IT help desk compensation		$77,500	$77,500	$77,500
Dt	IT headcount avoidance	D4*D5	$1,269,523.81	$1,269,523.81	$1,269,523.81
	Risk adjustment	↓5%			
Dtr	IT headcount avoidance (risk-adjusted)		$1,206,048	$1,206,048	$1,206,048

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Unquantified Benefits

While the interviewed organization reported strong and quantifiable benefits with its VMware Horizon implementation, it experienced additional significant benefits that were not quantified for this study. Those include:

› **Workforce time savings from lost, forgotten, or nonworking devices.** If an employee laptop was lost, forgotten at home, or not functioning properly, the interviewed organization could loan the employee one from its internal supply. The interviewee stated, "If an employee leaves their laptop at home, they get to grab one, and we have them in the cabinet, next to the service desk that has them preloaded, prepatched, all ready to go, and all they do is sign into their account."

› **Improved security.** The organization deployed VMware NSX, establishing policies to dynamically follow its virtual desktops and create an additional layer of defense. The interviewee explained: "Because of VMware, we have NSX protecting the devices as well. So, now you can have a firewall right outside a machine protecting it between two virtual machines sitting on the same server. That is huge when you can have a firewall that doesn't have to be inside the machine where a hacker can get to it; it is outside the machine, and it is protecting one user from another for free as part of your solution."

› **Improved employee experience.** The organization optimized the experience of all its users, providing a seamless experience across devices. Employees were empowered to use the devices of their choosing, with the ability to access the full functionality of their virtual desktop from all devices, from all locations.

Flexibility

The value of flexibility is clearly unique to each customer, and the measure of its value varies from organization to organization. There are multiple scenarios in which a customer might choose to implement Horizon and later realize additional uses and business opportunities, including:

› **Exploring new high-performance computing workloads.** Organizations can explore tackling new high-performance computing workloads, without the fear of incurring significant public cloud costs through cycle harvesting.

› **Enabling automated provisioning and device configuration.** Organizations can investigate creating automated provisioning and device-configuration processes, further improving IT efficiency and employee productivity.

Flexibility would also be quantified when evaluated as part of a specific project (described in more detail in Appendix A).

Five FTEs
spend 100% of their time on ongoing management of end user computing.

4,000 FTE hours
Total implementation and deployment time

Flexibility, as defined by TEI, represents an investment in additional capacity or capability that could be turned into business benefit for a 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.

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Analysis Of Costs

QUANTIFIED COST DATA

Total Costs

REF.	COST	INITIAL	YEAR 1	YEAR 2	YEAR 3	TOTAL	PRESENT VALUE
Etr	Fees paid to VMware	$150,000	$918,607	$143,000	$143,000	$1,354,607	$1,210,717
Ftr	Implementation, training, and change-over costs	$228,144	$228,144	$0	$0	$456,288	$435,548
Gtr	Ongoing internal costs	$0	$2,204,400	$2,204,400	$2,204,400	$6,613,200	$5,482,017
	Total costs (risk-adjusted)	$378,144	$3,351,151	$2,347,400	$2,347,400	$8,424,095	$7,128,282

Fees Paid To VMware

The organization paid VMware an upfront consulting fee to aid with the planning and implementation of Horizon. During this process, VMware guided the organization through the process of replacing all of its virtual machines and integrating with vSphere.

The organization paid an upfront license cost of $918,697 in Year 1 and also pays an annual license of $143,000 to VMware for 5,300 virtual machines.

Fees paid to VMware may vary based on the number of virtual machines an organization supports and the complexity of its environment prior to implementation.

Forrester did not adjust for these risks, yielding a three-year risk-adjusted total PV of $1,210,717.

> The table above shows the total of all costs across the areas listed below, as well as present values (PVs) discounted at 10%. Over three years, the interviewed organization expects risk-adjusted total costs to be a PV of more than $7.1 million.

Fees Paid To VMware: Calculation Table

REF.	METRIC	CALC.	INITIAL	YEAR 1	YEAR 2	YEAR 3
E1	VMware consulting fees		$150,000			
E2	VMware Horizon license			$918,607	$143,000	$143,000
Et	Fees paid to VMware	E1+E2	$150,000	$918,607	$143,000	$143,000
	Risk adjustment	0%				
Etr	Fees paid to VMware (risk-adjusted)		$150,000	$918,607	$143,000	$143,000

Implementation, Training, And Change-Over Costs

The organization initially invested 4,000 FTE hours in the implementation of Horizon and training for its support team. When switching from a competing virtual desktop provider to Horizon, the organization was required to change over VPN providers, thin clients, and back-end configurations.

Additionally, the organization required 4,000 FTE hours in the first year of deployment to manage ongoing integrations, train users, automate processes, and optimize its environment.

> Implementation risk is the risk that a proposed investment may deviate from the original or expected requirements, resulting in higher costs than anticipated. The greater the uncertainty, the wider the potential range of outcomes for cost estimates.

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The organization dedicated two full-time engineers and two full-time administrators to the implementation and ongoing management of Horizon.
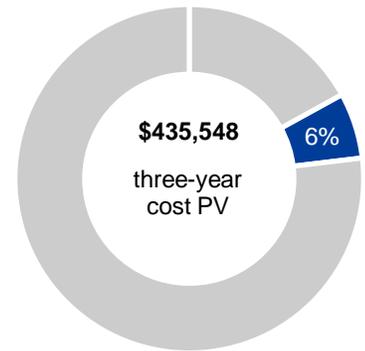
In modeling the implementation, training, and change-over costs, Forrester assumes:

› IT admin and engineering average hourly compensation is $54.32.

Forrester recognizes that implementation costs can vary based on specific organizational attributes and use cases. Specific risk considerations include:

› Size, scope, and complexity of operations.

› Available skill sets and specialized training of IT workforce.

› Organizational agility.

To account for these risks, Forrester adjusted this cost upward by 5%, yielding a three-year risk-adjusted total PV of $435,548.

$435,548
three-year
cost PV

6%

Implementation, training, and change-over: **6%** of total costs

	Implementation, Training, And Change-Over Costs: Calculation Table					
REF.	METRIC	CALC.	INITIAL	YEAR 1	YEAR 2	YEAR 3
F1	IT administration and engineering FTE hours		4,000	4,000		
F2	IT admin and engineering average hourly comp	$113,000/2,080	$54.32	$54.32		
F3	Total internal cost of implementation and training	F1*F2	$217,280	$217,280		
Ft	Implementation, training, and change-over costs	F3	$217,280	$217,280	$0	$0
	Risk adjustment	↑5%				
Ftr	Implementation, training, and change-over costs (risk-adjusted)		$228,144	$228,144	$0	$0

Ongoing Internal Costs

The organization incurs costs related to the ongoing operation of employee virtual desktops. The organization manages 5,300 VDI desktops, with an average cost of $20 per VDI — inclusive of network hardware, storage, storage arrays, optimizers, and other critical infrastructure components.

Furthermore, the organization has a dedicated staff of five engineers overseeing the ongoing management and maintenance of its VDI environment.

In calculating the costs on ongoing management, Forrester assumes.

› The fully burdened average annual salary for end user computing staff is $113,000.

Forrester recognizes that these results may not be representative of all experiences, and certain factors may limit the benefits gained for an organization. Specific risk considerations include:

› Internal life-cycle policies for infrastructure hardware.

› Internal skill sets and abilities to support VDI deployment.

› Competing organizational infrastructure demands.

$5.5 million
three-year
cost PV

77%
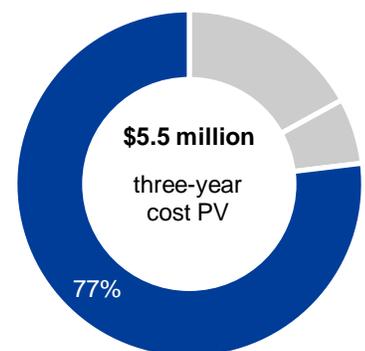
Ongoing internal costs: **77%** of total costs

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To account for these risks, Forrester adjusted this cost upward by 20%, yielding a three-year risk-adjusted total PV of $5,482,017.

REF.	METRIC	CALC.	INITIAL	YEAR 1	YEAR 2	YEAR 3
Ongoing Internal Costs: Calculation Table						
G1	Number of VDI desktops			5,300	5,300	5,300
G2	VDI cost per month			$20	$20	$20
G3	Staff dedicated to managing EUC ecosystem			5	5	5
G4	Average fully burdened comp			$113,000	$113,000	$113,000
Gt	Ongoing internal costs	(G1*G2*12)+ (G3*G4)		$1,837,000	$1,837,000	$1,837,000
	Risk adjustment	↑20%				
Gtr	Ongoing internal costs (risk-adjusted)		$0	$2,204,400	$2,204,400	$2,204,400

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Financial Summary

CONSOLIDATED THREE-YEAR RISK-ADJUSTED METRICS

Cash Flow Chart (Risk-Adjusted)

- Total costs
- Total benefits
- Cumulative net benefits
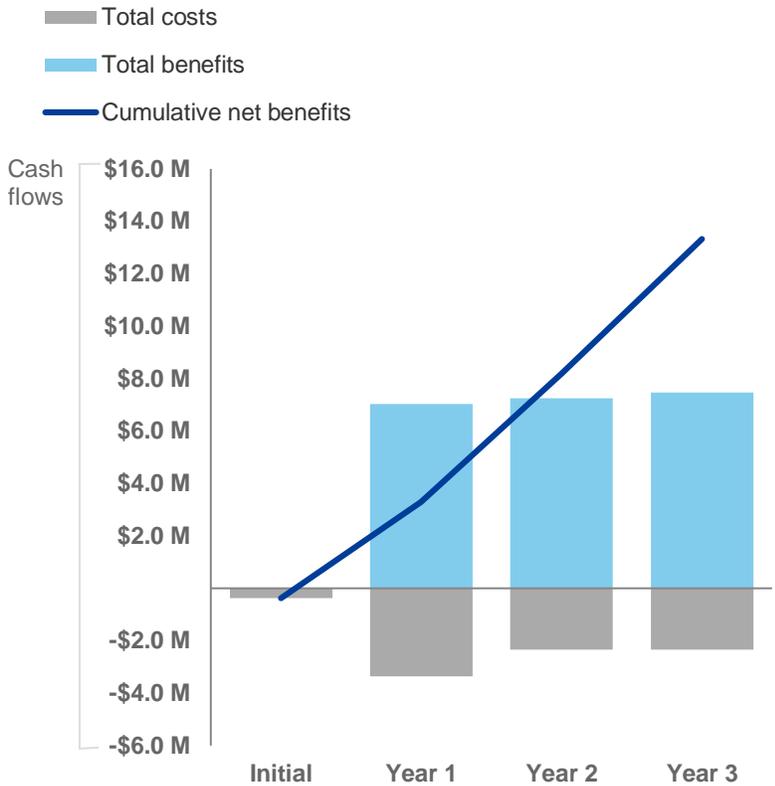
The financial results calculated in the Benefits and Costs sections can be used to determine the ROI, NPV, and payback period for the interviewed organization's investment. Forrester assumes a yearly discount rate of 10% for this analysis.

These risk-adjusted ROI, NPV, and payback period values are determined by applying risk-adjustment factors to the unadjusted results in each Benefit and Cost section.

Cash Flow Table (Risk-Adjusted)

	INITIAL	YEAR 1	YEAR 2	YEAR 3	TOTAL	PRESENT VALUE
Total costs	($378,144)	($3,351,151)	($2,347,400)	($2,347,400)	($8,424,095)	($7,128,282)
Total benefits	$0	$7,030,485	$7,246,598	$7,473,516	$21,750,598	$17,995,237
Net benefits	($378,144)	$3,679,334	$4,899,198	$5,126,116	$13,326,503	$10,866,955
ROI						152%
Payback period						< 3 months

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VMware End User Computing: Overview

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

About VMware
VMware software powers the world's complex digital infrastructure. The company's compute, cloud, mobility, networking, and security offerings provide a dynamic and efficient digital foundation to over 500,000 customers globally, aided by an ecosystem of 75,000 partners. Headquartered in Palo Alto, California, this year VMware celebrates 20 years of breakthrough innovation benefiting business and society. For more information please visit https://www.vmware.com/company.html.

VMware Workspace ONE®
VMware Workspace ONE® is an intelligence-driven digital workspace platform that simply and securely delivers and manages any app on any device by integrating access control, application management, and multiplatform endpoint management. It is available as an annual cloud subscription or a perpetual on-premises license. Workspace ONE integrates Unified Endpoint Management™ technology (formerly VMware AirWatch®) with virtual application delivery (VMware Horizon®) on a common identity framework. With Workspace ONE, organizations can now evolve siloed cloud and mobile investments, enabling all employees, devices, and things across the organization to accelerate their digital transformation journeys with a platform-based approach.

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Appendix A: Total Economic Impact

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.

Total Economic Impact Approach

Benefits represent the value delivered to the business by the product. The TEI methodology places 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.

Costs consider all expenses necessary to deliver the proposed value, or benefits, of the product. The cost category within TEI captures incremental costs over the existing environment for ongoing costs associated with the solution.

Flexibility represents the strategic value that can be obtained for some future additional investment building on top of the initial investment already made. Having the ability to capture that benefit has a PV that can be estimated.

Risks measure the uncertainty of benefit and cost estimates given: 1) the likelihood that estimates will meet original projections and 2) the likelihood that estimates will be tracked over time. TEI risk factors are based on "triangular distribution."

The initial investment column contains costs incurred at "time 0" or at the beginning of Year 1 that are not discounted. All other cash flows 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 in 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.

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.

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.

Return on investment (ROI)

A project's expected return in percentage terms. ROI is calculated by dividing net benefits (benefits less costs) by costs.

Discount rate

The interest rate used in cash flow analysis to take into account the time value of money. Organizations typically use discount rates between 8% and 16%.

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.

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