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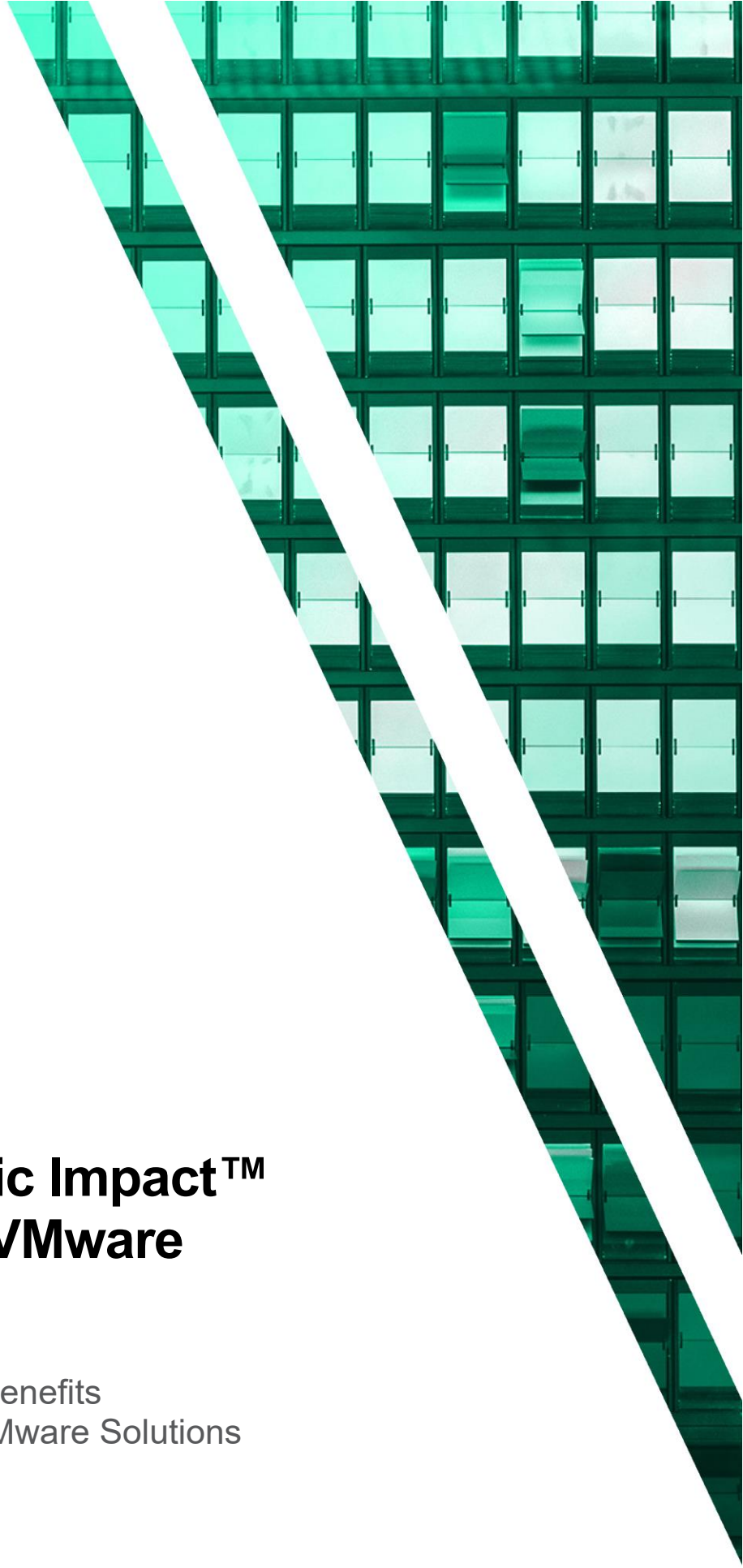

The Total Economic Impact™ Of IBM Cloud For VMware Solutions

Cost Savings And Business Benefits Enabled By IBM Cloud For VMware Solutions

MARCH 2024

A FORRESTER TOTAL ECONOMIC IMPACT™ STUDY COMMISSIONED BY IBM

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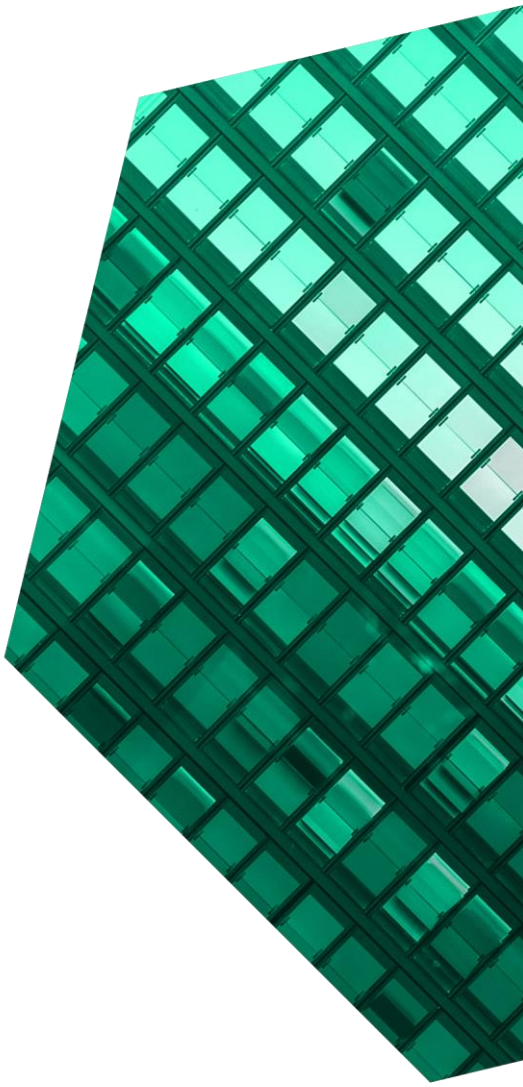

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Forrester provides independent and objective research-based consulting to help leaders deliver key outcomes. Fueled by our customer-obsessed research, Forrester's seasoned consultants partner with leaders to execute their specific priorities using a unique engagement model that ensures lasting impact. For more information, visit forrester.com/consulting.

Executive Summary

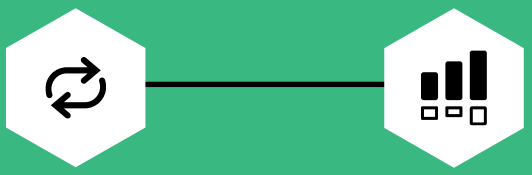
With IBM Cloud for VMware solutions, organizations can transition workloads into a hybrid cloud environment and improve the performance and reliability of their VMware environments. With this solution set, organizations can also increase developer productivity, reduce data center costs, improve operational efficiencies, and simplify security and compliance efforts, even in the most heavily regulated industries, resulting in a significant return on their modernization investment.

As enterprises look to embrace hybrid cloud and innovative AI to modernize their virtualized applications, IBM Cloud for VMware solutions provides a secure and flexible hybrid cloud platform that seamlessly enables the modernization and management of VMware workloads while balancing the critical aspects of cost, agility, and security.

IBM commissioned Forrester Consulting to conduct a Total Economic Impact™ (TEI) study and examine the potential return on investment (ROI) enterprises may realize by deploying IBM Cloud for VMware solutions.[1] The purpose of this study is to provide readers with a framework to evaluate the potential financial impact of IBM Cloud for VMware solutions on their organizations.

To better understand the benefits, costs, and risks associated with this investment, Forrester interviewed four representatives with experience using IBM Cloud for VMware solutions. For the purposes of this study, Forrester aggregated the interviewees' experiences and combined the results into a single composite organization that is a large global enterprise in a regulated industry that deploys VMware vCenter server on IBM Cloud.

KEY STATISTICS



Return on investment (ROI)
201%

Net present value (NPV)
$3.97M

Prior to using IBM Cloud for VMware solutions, interviewees noted that their organizations' VMware environments ran on-premises in a data center or colocation facility. However, to grow and maintain these environments, the interviewees' organizations incurred significant capital expenditures, ongoing maintenance costs, and space, power, and cooling costs. Interviewees told Forrester that they sought to modernize with a hybrid cloud solution to leverage the economics and flexibility of the cloud while also getting the most out of their current investments. However, interviewees' organizations struggled to find a provider that could address the breadth of diverse business and regulatory requirements and hesitated out of fear of new complexity.

Reduction in operational effort by Year 3

75%

With IBM Cloud for VMware solutions, interviewees noted their organizations could automate the migration of new and existing VMware workloads from on-premises to the IBM Cloud and gain the benefits of cloud infrastructure while continuing to leverage the same tools used on-premises. By simplifying the migration to the cloud, IBM Cloud for VMware solutions enabled the interviewees' organizations to scale resources up and down without worrying about overprovisioning or IT staffing, change capex to opex spending, and access flexible, consumption-based pricing. The interviewees noted their organizations could extend VMware infrastructure to the IBM Cloud to expand capacity, reduce on-premises data center infrastructure, improve disaster recovery, and increase security and compliance, all without a significant investment in new skills. On the IBM Cloud, the interviewees' organizations also had access to IBM partners in disaster recovery, backup, security, and compliance solutions, and access to Red Hat OpenShift to streamline developer productivity.

KEY FINDINGS

Quantified benefits. Three-year, risk-adjusted present value (PV) quantified benefits for the composite organization include:

- **A 40% reduction in data center costs by migrating VMware workloads to the IBM Cloud.** Moving to the cloud gives the composite organization the ability to reduce capex, overprovisioning, and other expenses associated with maintaining an on-prem data center. This saves the composite organization $1.5 million over three years.
- **A 75% reduction in operational effort due to efficiencies managing VMware workloads in the IBM Cloud.** The composite organization streamlines operations tasks, including procurement, provisioning, maintenance, and disaster recovery. Additionally, by keeping the same management tools, the composite avoids large-scale training or hiring for new skills. For the composite organization, this results in $1.2 million in savings over three years.
- **A 60% reduction in security and compliance efforts through built-in compliance features and simpler security administration.** Compliance and security features in IBM Cloud enables the composite organization to reduce internal efforts in these areas, providing an opportunity to work on other projects and productive assignments. The composite organization saves $663,000 on security and compliance efforts over three years.
- **A 90% reduction in downtime events due to reliability and performance gains after deploying IBM Cloud.** Access to more reliable and modern hardware with IBM Cloud improves environment availability, and if the composite organization does experience a downtime event, it recovers 70% quicker. The composite organization realized $797,000 in savings due to reduced downtime.
- **A 40% improvement in developer productivity.** The shift to containers through Red Hat OpenShift means the composite's developers can modernize legacy applications and innovate on new services. These developers achieve a faster time to market, higher-quality releases, more frequent releases, and fewer defects. Develop productivity improvements total $1.8 million in savings for the composite organization over three years.

Unquantified benefits. Benefits that provide value for the interviewees' organizations but are not quantified in this study include:

- **Optimized performance and improved customer satisfaction.** IBM Cloud granted the interviewees' organizations access to several configuration options that allowed them to optimize the performance of their workloads. As a

result, interviewees' organizations saw improvements in customer satisfaction.

- **Access to IBM support.** Interviewees lauded the support provided by IBM and its partners, finding them hands-on, helpful, and willing to be an active partner.

Costs. Three-year, risk-adjusted PV costs for the composite organization include:

- **IBM Cloud for VMware solutions costs.** The composite organization pays flexible per-CPU-based pricing and has a vCenter Server deployment with Red Hat OpenShift. Based on the composite organization's usage, this totals $1.2 million over three years.
- **Internal fees.** A team of internal staff works on initial planning, testing, and implementation. A subset of those continue to take part in migrating workloads on an ongoing basis. IT FTEs involved in implementation and ongoing migrations spend minimal upfront time on training as well. Internal fees cost the organization $768,000 over three years.

The representative interviews and financial analysis found that a composite organization experiences benefits of $5.95 million over three years versus costs of $1.98 million, adding up to a net present value (NPV) of $3.97 million and an ROI of 201%.

"IBM Cloud improved the reliability of our environment immensely and allowed us to increase application deployments. We are now able to innovate faster than ever before in a more secure and compliant environment."

— Technology officer, financial services

ROI
201%

BENEFITS PV
$5.95M

NPV
$3.97M

Benefits (Three-Year)

“IBM Cloud gives us greater control and transparency over cloud resources and configuration, and it allows us to deliver higher performance more consistently to our customers than we could with other platforms we looked at.”

— Cofounder, cybersecurity

TEI FRAMEWORK AND METHODOLOGY

From the information provided in the interviews, Forrester constructed a Total Economic Impact™ framework for those organizations considering an investment in IBM Cloud for VMware solutions.

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 IBM Cloud for VMware solutions can have on an organization.

The IBM Cloud For VMware Solutions Customer Journey

Drivers leading to the IBM Cloud for VMware solutions investment

Interviews

Role	Industry	Geography	Years Using IBM Cloud For VMware Solutions
IT manager	Public services	North America	2 years
VP of IT	Healthcare	North America	2 years
Technology officer	Financial services	APAC	3 years
Cofounder	Cybersecurity	Global	8 years

KEY CHALLENGES

Prior to investing in IBM Cloud for VMware solutions, the interviewees noted how their organizations struggled with common challenges, including the following:

- **Legacy on-premises setups that created significant capex, maintenance, and overhead costs and were not built for scale.** Most interviewees noted their organizations used VMware on-premises or in a colocation facility in their prior state, and the licensing and operational costs associated with these environments were high. The VP of IT at a healthcare organization explained: "The costs of our servers and the costs associated with upgrading the physical hosts every three years were through the roof. And this time around, when it was time to renew, we did a TCO [total cost of ownership] analysis and realized the cost of replacing our servers or even buying an extended warranty was unfeasible and frankly unreasonable. Essentially, extending use of our on-premises infrastructure and scaling with our existing solutions was almost impossible cost-wise at the rate we were growing."

  Additionally, on-premises infrastructure required provisioning and dedicated resources to maintain and operate it, but infrastructure management was not necessarily something IT FTEs wanted to spend their time doing. The same interviewee from a healthcare organization said: "We had 15 people involved in managing our on-premises environment in some capacity. But these folks were network and infrastructure engineers and DevOps team members. Those resources do not want to spend their time managing the hardware layer, they want to innovate and add value to the organization. We wanted to make sure we could leverage our people in the right way."

> **"With our on-premises environment, we didn't have enough resources to scale up or scale out at the rate we needed to, and doing so was expensive."**
>
> *Technology officer, financial services*

- **Instances of lengthy downtime.** The interviewees' organizations also experienced technical issues with their on-premises setups, which resulted in lengthy downtime, hindering employee performance. The IT manager at a

public services organization stated: “Disaster recovery and upkeeping business continuity were huge pain points in our environment. On-premises recovery takes a long time, and I wouldn’t say downtime events were infrequent. We wanted to improve system availability but weren’t really sure how to do that with our current setup.”

“We upgraded our on-premises VMware environment every three years, but the cost of upgrading those physical hosts was getting exorbitant, especially at the rate our data infrastructure needs are growing.”

Cofounder, cybersecurity

- **The inability to accommodate high security and compliance needs.** Interviewees’ organizations relayed that, with the workloads they had, the need for high security and compliance was there, but the costs of meeting that need in the on-premises environment in terms of software fees, time, and effort were too high. The VP of IT at a healthcare organization stated: “We have strong requirements around how secure are our servers are, how are we securing our data, and what kind of security protocols we have in place. With that said, our compliance team had concerns that our on-premises environment was not very secure and not very compliant, and if we’re falling behind on compliance, that essentially means we will stop getting new business as clients tend to have high thresholds we need to meet. To reach the governance standards we needed to, it would cost a lot. Therefore, we needed to move our environment to something that would reduce that risk for the company while optimizing costs.”
- **Cloud-first initiatives that pressured interviewees’ organizations to migrate workloads to a cloud solution.** Several interviewees noted their organizations were reaching an inflection point where they were out of capacity in their own data centers but didn’t want to continue with significant capital expenditures and overhead. However, the interviewees’ organizations struggled with huge legacy applications that they would have to move and worried about breaking those applications during migration. Therefore, the choice of cloud platform was crucial to accelerating cloud adoption. As the cofounder of a cybersecurity organization described, “Coming from a more traditional on-premises VMware background, we wanted something that would make the transition to the cloud simple and seamless; something that was compatible with our existing VMware environment.”

INVESTMENT OBJECTIVES

The interviewees’ organizations searched for a solution that could:

- Improve IT efficiency.
- Consolidate their data center footprint.
- Serve as a secure cloud solution with high governance standards.
- Improve infrastructure uptime and availability.
- Enable scaling without concern for the underlying IT infrastructure.

COMPOSITE ORGANIZATION

Based on the interviews, Forrester constructed a TEI framework, a composite company, and an ROI analysis that illustrates the areas financially affected. The composite organization is representative of the four interviewees, and it is used to present the

aggregate financial analysis in the next section. The composite organization has the following characteristics:

Description of composite. The composite organization is a large global enterprise in a regulated industry with stringent security and compliance requirements. It has many legacy applications and wants to be able to customize its solutions and retain control, including the ability to adjust security policies. The composite organization has been using VMware on-premises in its data centers but is approaching capacity constraints. It aims to modernize infrastructure and applications by transitioning to a cloud environment while reducing spending.

Deployment characteristics. IBM Cloud serves as a platform to migrate existing workloads to a new environment running on modern hardware for the composite organization. The composite organization invests in VMware vCenter Server on IBM Cloud, which includes the automated installation of vSphere on bare metal with licensing for VMware vSphere, vSAN, NSX, HCX, and VMware Cloud Foundation. This secure single-tenant implementation meets the composite organization's requirements. The composite organization begins with planning and proofs of concept.

Once the solution is implemented, the composite organization begins to easily lift and shift workloads without rearchitecting environments. It manages workloads using the same interface as it did on-premises. By Year 3, the composite has two clusters with 10 servers, hosting 700 virtual machines (VMs). It also leverages IBM's partners for disaster recovery (DR) and backup/replication, and Red Hat OpenShift to build, modernize, and deploy applications at scale. The composite organization migrates 100% of its workloads by Year 3.

Why IBM Cloud?

Interviewees noted their organizations chose IBM Cloud for the following reasons:

- Compatibility with existing VMware environments.
- Consistent management across cloud and on-premises environment through the vCenter server and familiar VMware tools.
- Custom infrastructure fit based on the security and compliance needs of an organization's workloads.
- High infrastructure speed and reliability.
- Ease of deployment and management.
- The ability to modernize with Red Hat OpenShift.
- IBM brand reputation and expertise.

Key Assumptions

- **VMware vCenter Server deployed on IBM Cloud**
- **Two clusters**
- **10 servers**
- **700 VMs by Year 3**
- **Migration ramp over three years from 50% to 100%**

Analysis Of Benefits

Quantified benefit data as applied to the composite

Total Benefits

Ref.	Benefit	Year 1	Year 2	Year 3	Total	Present Value
Atr	Reduced data center cost	$469,300	$602,775	$744,800	$1,816,875	$1,484,377
Btr	Increased operational efficiency	$247,000	$463,125	$741,000	$1,451,125	$1,164,018
Ctr	Increased compliance and security efficiency	$158,460	$267,401	$396,150	$822,011	$662,681
Dtr	Reduced downtime	$218,250	$327,375	$436,500	$982,125	$796,916
Etr	Increased developer productivity	$364,500	$729,000	$1,215,000	$2,308,500	$1,846,690
	Total benefits (risk-adjusted)	$1,457,510	$2,389,676	$3,533,450	$7,380,636	$5,954,682

REDUCED DATA CENTER COST

Evidence and data. Interviewees noted that the IBM Cloud for VMware solutions investment gave their organizations the ability to move critical workloads from on-premises data centers to the cloud without having to repurchase or change their tools as part of the investment. In turn, interviewees' organizations could consolidate on-premises infrastructure, reducing the need for large capital expenditures on hardware, the cost of software needed to manage sensitive data, the cost of power and cooling, and additional expenditures for disaster recovery sites.

- The IT manager at a public services organization said: "It was reaching the time where we would either have to replace our servers or pay for additional maintenance on them, and I realized moving to the cloud was just cheaper, as we could stop worrying about replacing hardware. As a VMware shop, IBM Cloud made that transition seamless." This interviewee's organization saved more than $300,000 per year in capex from not having to house an on-premises environment.
- The VP of IT at a healthcare organization said: "I can easily scale capacity up and down with IBM Cloud when there is seasonality or if we suddenly get an influx of new clients. We always have to plan for that in your on-premises environment, and the worst thing is you never know when it's coming. As such, you must oversubscribe for infrastructure, and 90% of the time that infrastructure goes unused. We're saving at least 20% per year of what we used to spend from this benefit, in terms of infrastructure, heating, cooling, and electricity."

"We no longer have to think about floor space, power and cooling usage, or even expenditure related to travel from people visiting data facilities. We don't have to face the delays we used to around getting someone out to a data center to resolve an issue."

Cofounder, cybersecurity

- The cofounder of a cybersecurity organization explained: “With IBM Cloud, we get more frequent upgrades, the availability of additional services, and geographic redundancy. We also don’t have to think about getting the most value out of capital expenditure; if something new comes along, we can migrate easily at the same cost and easily take advantage of things that would offer more value.”

Modeling and assumptions. For the composite organization, Forrester assumes the following:

- In Year 1, the composite organization achieves a 30% cost savings for workloads migrated to the cloud. This increases to 40% by Year 3 as the composite migrates more workloads.
- The total cost avoided is included in the calculation and is offset by the IBM Cloud for VMware solutions cost detailed in the Analysis Of Costs section to properly consider the net savings achieved in the analysis results.

Risks. Reduced data center costs may vary depending on the following:

- The size and scope of IBM Cloud deployment.
- The size and scope of legacy state deployment.
- The ability and willingness of organizations to move to the cloud.

“We’ve cut our electricity usage by one-third as we started migrating to the cloud. We also did not have to upgrade to a new $50,000 cooling unit.”

IT manager, public services

Results. To account for these risks, Forrester adjusted this benefit downward by 5%, yielding a three-year, risk-adjusted total PV (discounted at 10%) of $1.5 million.

Reduced Data Center Cost

Ref.	Metric	Source	Year 1	Year 2	Year 3
A1	Reduced data center cost	Interviews	$494,000	$634,500	$784,000
At	Reduced data center cost	A1	$494,000	$634,500	$784,000
	Risk adjustment	↓5%			
Atr	Reduced data center cost (risk-adjusted)		$469,300	$602,775	$744,800
	Three-year total: $1,816,875			**Three-year present value: $1,484,377**	

INCREASED OPERATIONAL EFFICIENCY

Evidence and data. The interviewees' organizations reduced the internal effort required to manage workloads and hardware compared to the legacy environment due to the performance and reliability improvements delivered by IBM Cloud for VMware solutions. Interviewees noted their organizations achieved efficiencies in procurement, provisioning, maintenance, support, and disaster recovery as a result. Also, with root access control down to the hypervisor layer, the operations team at interviewees' organizations could manage workloads using the same tools as before, requiring no new skills or major training. By bringing operations into the cloud, staff focused on higher-value tasks.

- The technology officer at a financial services company explained: "In our on-premises environment, we would have to wait months for the server to arrive. Now I can set up and provision a bare metal in a couple of hours."
- The VP of IT at a healthcare organization said: "The amount of time people were spending on maintaining the resources was exorbitant, but with IBM Cloud, working on things like patching and upgrading has reduced a lot. Also, increasing the capacity of a server was a big task earlier. If we wanted to increase storage, we had to file a request, get the approvals, and add the hardware. This task, which was taking two months previously, now takes a few clicks." Their healthcare organization reduced the workload of operational resources by 60% to 80% as they transitioned more workloads to IBM Cloud.
- The IT manager at a public services organization shared: "We've seen a reduction in IT tickets because there aren't people complaining about an application down because it's not going down anymore. And then within the infrastructure environment, we had issues every week around the cables, switches, anything. With IBM, the only issues that we have are made by ourselves."

> **"It would be impossible to continue our on-prem environments with the number of workloads we have now and the cost of the resources that would be needed. That's why going to the cloud was a great choice, and IBM Cloud was the best decision because we didn't need to retrain folks."**
>
> *VP of IT, healthcare*

- The same interviewee explained: "Our on-premises backups used to take hours to configure to make sure they were seamless and secure. This has become simpler in IBM Cloud because a lot of it is taken care of for you. There are efficiencies in building it, automating it, and not having to do it again and again since IBM has set best practices on how to do it. With IBM Cloud, we save at least 3 hours of effort per day around scheduling, configuration, and replication of backups, and having to revisit failed ones being replicated.

Modeling and assumptions. For the composite organization, Forrester assumes the following:

- In the legacy environment, the composite organization required up to eight FTEs by Year 3 to manage the VMware workloads.
- With IBM Cloud, two FTEs manage the same number of workloads.
- The average fully loaded annual salary for impacted FTEs is $130,000.
- In Year 1, 50% of the benefits are achieved as the composite organization is actively migrating workloads throughout the year. This increases to

75% in Year 2 and 100% in Year 3, as all workloads are migrated.

Risks. Increased operational efficiency may vary depending on the following:

- The size, scope, and complexity of existing workloads.
- The number of workloads migrated to IBM Cloud.
- The level of automation achieved through leveraging IBM and VMware tooling.
- The salaries of FTEs.

Results. To account for these risks, Forrester adjusted this benefit downward by 5%, yielding a three-year, risk-adjusted total PV of $1.2 million.

Increased Operational Efficiency

Ref.	Metric	Source	Year 1	Year 2	Year 3
B1	FTEs needed to manage workloads in legacy environment	Interviews	6	7	8
B2	FTEs needed to manage workloads with IBM Cloud for VMware solutions	Interviews	2	2	2
B3	Fully loaded annual salary for FTEs managing VMware workloads	TEI standard	$130,000	$130,000	$130,000
B4	Migration ramp	Composite	50%	75%	100%
Bt	Increased operational efficiency	(B1-B2)*B3*B4	$260,000	$487,500	$780,000
	Risk adjustment	↓5%			
Btr	Increased operational efficiency (risk-adjusted)		$247,000	$463,125	$741,000
	Three-year total: $1,451,125			**Three-year present value: $1,164,018**	

INCREASED COMPLIANCE AND SECURITY EFFICIENCY

Evidence and data. Interviewees noted that built-in compliance features allowed their organizations to reduce internal efforts and expenditures on resources needed to maintain proper governance of sensitive information.

- The IT manager at a public services organization shared, “Having IBM, who has all the cloud and compliance certifications we need, built-in cloud security, disaster recovery planning, and business continuity capabilities, makes it much easier when it comes to working with auditors, as they can see we have a really good vendor behind us that checks are the boxes they’re looking at.”
- The VP of IT at a healthcare organization explained: “Audits have become much more efficient because we know and are much more confident things are well documented with IBM Cloud for VMware solutions. When it comes to internal and external audits, the workload is 25% of what it used to be for compliance teams. And if you think about the amount of time IT spent to provide the information and provide the clarifications if there are concerns, they are also now spending 5% of the time they used to.”

Additionally, access to IBM’s security partners through integrations with IBM Cloud for VMware solutions led to simpler security administration, better visibility, and reduced costs. With root access control, the admins at the interviewees’ organizations could control security policies, including being able to fully isolate instances from the public internet.

- The IT manager at a public services organization said: “We did around 10 patching cycles a year. We can avoid those for the workloads moved to or created on IBM Cloud, which saves us at least 15 hours on a quarterly basis.”
- The technology officer at a financial services organizations explained, “Because we are not the owners of the machines, we don’t have to spend all of our time searching for new fixes and installing these fixes.”

Modeling and assumptions. For the composite organization, Forrester assumes the following:

- The FTEs that would have been required to manage compliance and security tasks associated with the increasing VMware workloads in the legacy environment would have grown from four in Year 1 to five in Year 3.
- Migrating VMware workloads to IBM Cloud reduces the effort needed to manage compliance and security tasks by 60%.
- The average fully loaded annual salary for compliance and security FTEs is $139,000.
- In Year 1, 50% of the benefits are achieved as the composite organization is actively migrating workloads throughout the year. This increases to 75% in Year 2 and 100% in Year 3, as all workloads are migrated.

Risks. Increased compliance and security efficiency may vary depending on the following:

- Security and compliance requirements.
- The ability to leverage IBM’s and IBM partners’ security tools to streamline security tasks.
- The available capacity and skill set of security and compliance FTEs.
- The salaries of FTEs.

Results. To account for these risks, Forrester adjusted this benefit downward by 5%, yielding a three-year, risk-adjusted total PV of $663,000.

Increased Compliance And Security Efficiency					
Ref.	**Metric**	**Source**	**Year 1**	**Year 2**	**Year 3**
C1	FTEs needed to manage compliance and security in legacy environment	Interviews	4.0	4.5	5.0
C2	Reduction in time spent managing compliance and security with IBM Cloud for VMware	Interviews	60%	60%	60%
C3	Fully loaded annual salary for FTEs managing compliance and security	TEI standard	$139,000	$139,000	$139,000
C4	Migration ramp	Composite	50%	75%	100%
Ct	Increased compliance and security efficiency	C1*C2*C3*C4	$166,800	$281,475	$417,000
	Risk adjustment	↓5%			
Ctr	Increased compliance and security efficiency (risk-adjusted)		$158,460	$267,401	$396,150
	Three-year total: $822,011			**Three-year present value: $662,681**	

REDUCED DOWNTIME

Evidence and data. IBM Cloud for VMware solutions improved the performance of environments at the interviewees' organizations through improved availability with more reliable and modern hardware. Interviewees mentioned that if there was a downtime event, their organizations found it easier to recover than ever before, which impacted internal operations as well as customer experience.

- The cofounder of a cybersecurity organization told Forrester: "Our ability to keep things operating and keep the clients up is significantly higher because we can constantly upgrade to the latest IBM Cloud is offering and use VMware to migrate with no downtime our customers to the new hardware. As a result, for the same cost for the customer, we can deliver increased performance over time. They're always getting the latest."
- The same interviewee added: "With VMware and its control and the flexibility we have with our infrastructure through IBM Cloud, our security team is a lot more confident that there isn't going to be a disruption. And for what we do, not having constant availability is not acceptable."

"In the seven years or eight years that we've been running an IBM Cloud, there's only been one outage of short duration that we were able to manage for our customers. If I compare that with the previous 10 years of colocation from a large colocation provider, it was pretty normal to experience one significant outage per year. We just haven't seen that in IBM Cloud."

Cofounder, cybersecurity

- The VP of IT at a healthcare organization explained: "If something happened to our data

center or our servers during business hours, applications are down and business groups cannot work. There was a loss of productivity, and those business group leaders were then always mad at IT. They would complain that they can't meet their targets because applications were down for 8 to 10 hours a month. And then, if it's something related to our call center, it's also affecting patient experience. With IBM Cloud, downtime events have reduced by 90%. And if it happens, the impact isn't as large scale. This led to a less strained relationship between business and IT."

- The IT manager at a public services organization stated: "One of our mission critical environments as a very large database server has 3 TB in it. That server can take us a good 3 hours to work on when we do our failover testing for a disaster recovery plan, which entails moving data to the VMware console on the other side and restoring the server. In IBM Cloud, that same test could take us an hour. So, the recovery time is quicker, probably by 50%, partly because we don't have to move data from one location to the other, which is nice. We haven't had a major disaster, but if we did, this is a huge win."
- The technology officer at a financial services organization said: "When we have a downtime issue in our IBM Cloud for VMware environment, which is not often, the downtime is 70% of what it would have been because it used to take a long time to replace the hardware. That's not an issue anymore."

Modeling and assumptions. For the composite organization, Forrester assumes the following:

- The composite organization experienced 10 downtime events per year in its prior environment.
- The number of downtime events per year reduces by 90% once the environment is fully migrated to IBM Cloud.
- The cost per downtime event, including the time and cost of repairs and the cost of lost business, averages $50,000.
- The time to resolve remaining downtime events is reduced by 70% in the IBM Cloud environment.
- In Year 1, 50% of the benefits are achieved as the composite organization is actively migrating workloads throughout the year. This increases to 75% in Year 2 and 100% in Year 3, as all workloads are migrated.

Risks. Reduced downtime may vary depending on the following:

- The frequency, duration, and underlying causes of the prior disruptions.
- The ability of IT personnel to remediate service disruptions.
- Downtime costs are highly variable between organizations and industries. Some industries, like financial services, will have higher costs of downtime that are easier to measure and track, while other industries may not be able to easily correlate downtime with lost business. Some organizations may build out more robust redundancies while others may not be willing to incur as much expense in this area.

Results. To account for these risks, Forrester adjusted this benefit downward by 10%, yielding a three-year, risk-adjusted total PV of $797,000.

Reduced Downtime					
Ref.	**Metric**	**Source**	**Year 1**	**Year 2**	**Year 3**
D1	Downtime events per year in legacy environment	Interviews	10	10	10
D2	Reduction in downtime events in IBM Cloud for VMware environment	Interviews	90%	90%	90%
D3	Cost per downtime event	Composite	$50,000	$50,000	$50,000
D4	Subtotal: Cost savings due to a reduction in downtime events in the IBM Cloud for VMware solutions	D1*D2*D3	$450,000	$450,000	$450,000
D5	Reduction in time to resolve remaining downtime events in IBM Cloud for VMware solutions	Interviews	70%	70%	70%
D6	Subtotal: Cost savings due to a reduction in time to resolve remaining downtime events in IBM Cloud for VMware solutions	D1*(1-D2)*D3*D5	$35,000	$35,000	$35,000
D7	Migration ramp	Composite	50%	75%	100%
Dt	Reduced downtime	(D4+D6)*D7	$242,500	$363,750	$485,000
	Risk adjustment	↓10%			
Dtr	Reduced downtime (risk-adjusted)		$218,250	$327,375	$436,500
	Three-year total: $982,125			**Three-year present value: $796,916**	

INCREASED DEVELOPER PRODUCTIVITY

Evidence and data. Interviewees noted their organizations used Red Hat OpenShift to innovate freely and extend workloads using containers. Developers spent time on application modernization and moving legacy applications to the cloud to innovate and add more services to make end users happier. Developers also deployed net-new workloads to the cloud. As IBM Cloud supported rapid application development and testing, key outcomes included faster time to market and increased release frequency.

- The technology officer at a financial services organization said: "Developers are seeing a reduced number of activities that they are responsible for. They no longer have to worry about the physical infrastructure, the procurement fees, or any of those aspects related to hardware. It frees them up to focus on other tasks and allows them to put more automation scripts in place where they can

"Productivity has improved by 30% to 40% over time, and developers no longer have to spend too much time on unnecessary things like coordination, waiting for others, or planning needed to line everything up from development to production. Now, things have become more independent."

VP of IT, healthcare

automate the deployment of certain VMs into our environment."

- The VP of IT at a healthcare organization explained: "I haven't reduced my development team, it's just the same amount of folks that I have now can do more. They're able to support more applications and build new applications so I don't have to hire more people for development. And on top of that, morale has increased because there are less performance issues and things can get done faster."
- The same interviewee went on to share: "With IBM Cloud, the best thing is we don't have to worry about freeing up server resources. Each developer can also have their own environment, rather than sharing an environment with different teams. So we don't have the issue where, 'Okay because that team is doing UAT [user acceptance testing], nobody can touch that server for next week or 10 days now.' If someone needs servers to run something, others no longer need to wait and coordinate their schedules around it due to limited resources. And, with cloud being a consumption-based model, whether you're using 10 servers versus 20 servers, the cost difference is minimal."
- Developer productivity also increased at the interviewees' organizations due to the simplification of security and compliance tasks by deploying IBM Cloud for VMware solutions. The IT manager at a public services organization stated, "The effort needed for mundane tasks like security and compliance reduced by at least 20% in our new environment."

Modeling and assumptions. For the composite organization, Forrester assumes the following:

- In Year 1, 30 developers use RedHat OpenShift on IBM Cloud, increasing to 50 developers by Year 3.
- Initially, the productivity improvement averages 20% and increases to 40% by Year 3 as developers become more familiar with Red Hat OpenShift and more VMware workloads are moved to IBM Cloud.
- The average fully loaded annual salary of a developer is $135,000.
- Forrester conservatively estimates that 50% of the total time saved per developer FTE is applied directly back to value-generating tasks, and it is therefore included in the benefit calculation. Individual employees may apply additional time savings toward professional development, training, and work-life activities that are not included in the benefit analysis.

Risks. Increased developer productivity may vary depending on the following:

- The ability of developer teams to leverage Red Hat OpenShift in their work.
- The size, scope, and complexity of the workloads being deployed or extended.
- The available capacity and skill set of the developers.
- The salaries of FTEs.

Results. To account for these risks, Forrester adjusted this benefit downward by 10%, yielding a three-year, risk-adjusted total PV of $1.8 million.

Increased Developer Productivity					
Ref.	**Metric**	**Calculation**	**Year 1**	**Year 2**	**Year 3**
E1	Number of developers	Interviews	30	40	50
E2	Productivity improvement	Interviews	20%	30%	40%
E3	Fully loaded annual salary for a developer	TEI standard	$135,000	$135,000	$135,000
E4	Productivity recapture	TEI standard	50%	50%	50%
Et	Increased developer productivity	E1*E2*E3*E4	$405,000.00	$810,000.00	$1,350,000.00
	Risk adjustment	↓10%			
Etr	Increased developer productivity (risk-adjusted)		$364,500	$729,000	$1,215,000
	Three-year total: $2,308,500			**Three-year present value: $1,846,690**	

UNQUANTIFIED BENEFITS

Interviewees mentioned the following additional benefits that their organizations experienced but were not able to quantify:

- **Optimized performance and improved customer satisfaction.** With deep access to root configuration and a catalog of configuration options, interviewees noted their organizations could customize workloads based on their needs. Additionally, with high availability of mission-critical applications and the mitigation of outages with IBM Cloud, the interviewee's organizations saw improvements in customer confidence and brand integrity.

  The cofounder of a cybersecurity organization said: "By doing it all from scratch, we're able to optimize our environment and make sure that our customers are getting the best performance. Also, IBM Cloud allows us to offer our customers native access to low-cost cold storage, which is another plus for them." The technology officer of a financial services organization remarked, "Using IBM Cloud for VMware in our lower environment allows us to deploy more applications faster to customers, which improves their overall experience." The VP of IT at a healthcare organization explained, "We definitely noted a reduced number of complaints from customers because systems are down less often."

> **"IBM Cloud has enabled our digital transformation journey."**
>
> *Technology officer, financial services*

- **Access to IBM support.** IBM provides its customers with access to expertise and guidance on how to make the most of their investment in IBM Cloud for VMware solutions. The cofounder of a cybersecurity organization explained: "The subscription to IBM Cloud comes with a bonus of access to experts who are available and willing to help. This was not always the case when it came to the vendor in our previous setup." The IT manager of a public services organization also highlighted the level of support seen with IBM,

stating: “Their support was one of our drivers for selecting them. They always have the expertise if you need it, and we’ve never had a bad experience working with them.”

FLEXIBILITY

The value of flexibility is unique to each customer. There are multiple scenarios in which a customer might implement IBM Cloud for VMware solutions and later realize additional uses and business opportunities, including:

- **The door-to-digital transformation.** Interviewees noted their organizations added new or better cloud services, including for backup, replication, and disaster recovery, by using some of the operational and infrastructure cost savings to invest in additional capabilities offered by IBM or IBM partners. Additionally, migrating to IBM Cloud enabled the interviewees’ organizations to be better positioned to take on other improvement initiatives through digitization. The VP of IT at a healthcare organization said: “Internally, things are set up according to best practices and are therefore more streamlined. It allows use to be more agile and flexible in terms of setting up something new in the cloud.”
- **Improved scalability.** Interviewees noted that migrating VMware workloads provided their organizations with the ability to easily expand or reduce their storage needs as business requirements or demands evolve. The technology officer at a financial services organization explained: “We can scale out as needed and when we need it in the future because we no longer have to deploy underlying hardware infrastructure every time we scale. Everything is more automatic in IBM Cloud, so we could essentially expand overnight if we needed to.”

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

Analysis Of Costs

Quantified cost data as applied to the composite

Total Costs							
Ref.	**Cost**	**Initial**	**Year 1**	**Year 2**	**Year 3**	**Total**	**Present Value**
Ftr	IBM Cloud for VMware solutions cost	$0	$399,000	$493,500	$588,000	$1,480,500	$1,212,352
Gtr	Internal fees	$129,081	$445,500	$148,500	$148,500	$871,581	$768,378
	Total costs (risk-adjusted)	$129,081	$844,500	$642,000	$736,500	$2,352,081	$1,980,730

IBM CLOUD FOR VMWARE SOLUTIONS COST

Evidence and data. IBM Cloud for VMware solutions offers flexible consumption-based pricing based on physical CPU that allowed the interviewees' organizations to easily scale up and down as workload requirements evolved. Interviewees noted that Red Hat OpenShift also came with a monthly subscription cost.

Modeling and assumptions. For the composite organization, Forrester assumes the following:

- IBM provided an estimate of the solution cost based on the composite organization's deployment, which assumes that the organization deploys two clusters with 10 servers and hosts 700 VMs by Year 3.
- The solution cost includes automated installation of VMware vSphere on bare metal, licensing for vSphere, vSAN, NSX, HCX, and VCF, and subscription costs for Red Hat OpenShift.
- Costs grow over time as the composite migrates additional workloads and expands to new workloads.
- The composite organization does not leverage any of IBM's services offerings. Some organizations, however, may leverage IBM to help design and implement their VMware solutions investment.
- Pricing may vary. Contact IBM for additional details.

Risks. IBM Cloud for VMware solutions cost may vary depending on the differences in the configuration, consumption, vendor discounts, and volume discounts.

Results. To account for these risks, Forrester adjusted this cost upward by 5%, yielding a three-year, risk-adjusted total PV (discounted at 10%) of $1.2 million.

IBM Cloud For VMware Solutions Cost						
Ref.	**Metric**	**Calculation**	**Initial**	**Year 1**	**Year 2**	**Year 3**
F1	IBM Cloud for VMware solutions cost	Composite		$380,000	$470,000	$560,000
Ft	IBM Cloud for VMware solutions cost	F1	$0	$380,000	$470,000	$560,000
	Risk adjustment	↑5%				
Ftr	IBM Cloud for VMware solutions cost (risk-adjusted)		$0	$399,000	$493,500	$588,000
	Three-year total: $1,480,500			**Three-year present value: $1,212,352**		

INTERNAL FEES

Evidence and data. Interviewees discussed varying levels of planning and implementation efforts undertaken by internal personnel to facilitate the integration of IBM Cloud for VMware.

Typically, the implementation effort began with a discovery workshop to identify and bucket workloads by complexity and criticality. Interviewees noted that the implementation of the solution itself was very quick. Once the system was up and running, the interviewees' organizations started moving workloads using tools like HCX. No refactoring was required. Most interviewees noted their organizations took a phased approach, prioritizing easier workloads or those running on older servers to move first, followed by increased migration over time.

- The technology officer noted their financial services organization involved five FTEs, including a project manager, architect, subject matter expert (SME), and two cloud engineers, in the implementation process. Implementation took six months.
- The VP of IT noted their healthcare organization used a cross functional team of 12 people for 25% of their time during the two-month implementation period. The interviewee said, "Phase one was low hanging fruit because, here, we could show success while focusing our learning curve on less critical applications and workloads rather than our most critical. Full migration took one to two years."

While engineers involved in the implementation process were already familiar with VMware, they did take part in training to understand the IBM Cloud environment.

- For the cofounder at a cybersecurity organization, this took the form of educational videos and knowledge-based articles. The cofounder explained, "We put together an example that any of our engineers could run through, which included instructions on how to deploy and expand the VMware environment on IBM Cloud, and references both IBM Cloud and VMware documentation."
- Other interviewees' organizations used a learn-it-as-you-use-it approach throughout the implementation period.

Modeling and assumptions. For the composite organization, Forrester assumes the following:

- A team of eight people spends three months and 40% of their time on testing, planning, and piloting the solution.
- During Year 1, a team of six people spend half their time migrating workloads to IBM Cloud.
- During Years 2 and 3, a team of two people spend half their time migrating additional workloads to IBM Cloud.

- Six IT FTEs require 24 hours of training each to facilitate the deployment and integration of the solution.
- The average fully loaded annual salary for a cross-functional integration team member is $135,000.

Risks. Internal fees may vary depending on the following:

- The size and complexity of environments.
- The experience and skill set of internal staff.
- The need for training due to differences in the experience and skill set of IT personnel.

Results. To account for these risks, Forrester adjusted this cost upward by 10%, yielding a three-year, risk-adjusted total PV of $768,000.

"It took us about two weeks to get our VMware environment set up in IBM Cloud. If we didn't use IBM, it would have taken at least three months of dedicated effort with another cloud platform to go in, build, break things, and troubleshoot."

Cofounder, cybersecurity

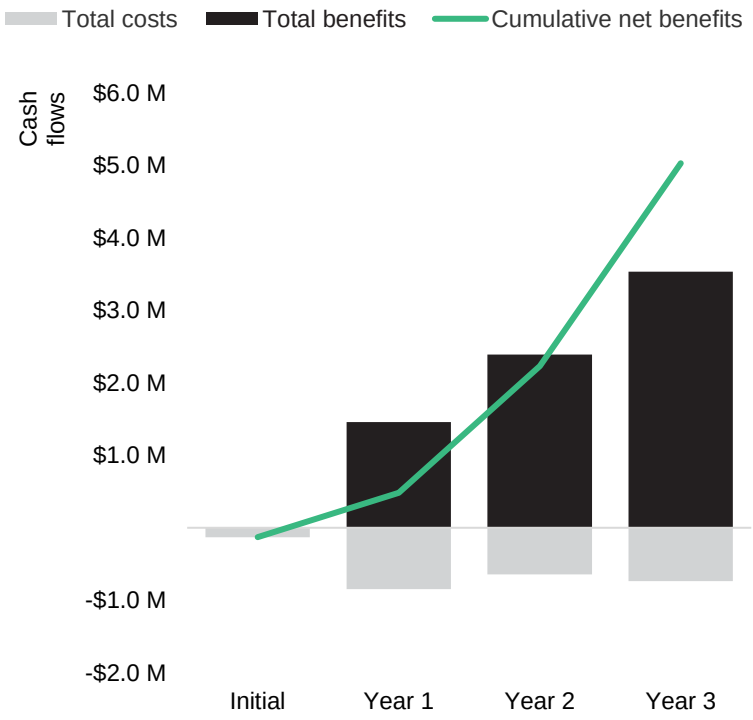
Internal Fees

Ref.	Metric	Calculation	Initial	Year 1	Year 2	Year 3
G1	FTEs for deployment and integration efforts	Interview	0.80	3.00	1.00	1.00
G2	IT FTEs requiring training	Interviews	6	0	0	0
G3	Hours of training	Interviews	24	0	0	0
G4	Fully loaded annual salary for cross-functional integration team	TEI standard	$135,000	$135,000	$135,000	$135,000
Gt	Internal fees	(G1*G4) + (G2*G3*(G4/2,080))	$117,346	$405,000	$135,000	$135,000
	Risk adjustment	↑10%				
Gtr	Internal fees (risk-adjusted)		$129,081	$445,500	$148,500	$148,500
	Three-year total: $871,581			**Three-year present value: $768,378**		

Financial Summary

CONSOLIDATED THREE-YEAR RISK-ADJUSTED METRICS

Cash Flow Chart (Risk-Adjusted)



The financial results calculated in the Benefits and Costs sections can be used to determine the ROI, NPV, and payback period for the composite 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 Analysis (Risk-Adjusted Estimates)

	Initial	Year 1	Year 2	Year 3	Total	Present Value
Total costs	($129,081)	($844,500)	($642,000)	($736,500)	($2,352,081)	($1,980,730)
Total benefits	$0	$1,457,510	$2,389,676	$3,533,450	$7,380,636	$5,954,682
Net benefits	($129,081)	$613,010	$1,747,676	$2,796,950	$5,028,555	$3,973,952
ROI						201%

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.

Appendix B: Endnotes

[1] 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.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