A Forrester Total Economic Impact™
Study Commissioned By VMware
July 2019

The Total Economic Impact™ Of VMware vRealize Automation

Cost Savings And Business Benefits Enabled By vRealize Automation

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"vRealize Automation has made a much more scalable, stable, and agile environment with more consistency across the applications we deploy. It's increased productivity and shortened time-to-deployment."

Platform engineer, healthcare services

"Instead of manual work to protect the environment, [with vRealize Automation], the environment protects itself."

Manager, sr. systems architect, healthcare technology

"We need a lot less IT labor [with vRealize Automation]. There's fewer manual tasks, misconfigurations, and less handholding. Environments are all consistent, stable, and secure."

Systems administrator, B2B software

Executive Summary

VMware vRealize Automation enables customers to develop automation workflows for a broad range of tasks, including the creation, management, and retirement of infrastructure and software services. VMware commissioned Forrester Consulting to conduct a Total Economic Impact™ (TEI) study and examine the potential ROI organizations may realize by deploying vRealize Automation. To better understand the benefits, costs, and risks associated with this investment, Forrester interviewed four customers, each with many years of experience using vRealize Automation. Forrester constructed a composite organization and associated financial analysis representative of these interviewees to provide readers with a framework to evaluate the potential financial impact of the vRealize Automation on their organizations.

Key Findings

Quantified benefits. The following three-year, risk-adjusted present value (PV) benefits for the composite organization are representative of those experienced by the interviewed companies:

- **Enhanced operational efficiency with automation, saving $3.9 million in IT labor costs.** Deployments and retirements each previously required 2.5 hours of labor while Day 2 operations required 2 hours of labor; with vRealize Automation, no manual labor was needed as end users could submit requests via self-service portals. Even as automation drove a significant spike in activity, the organization avoided over 86,000 labor hours across almost 37,000 IT actions over a three-year period.
- **Optimized resource capacity utilization, avoiding $2.4 million in additional infrastructure costs.** The composite organization increased its virtual machine (VM) churn rate from 10% to 50%; freed space from unneeded workloads; and drove a cultural shift of requesting only what users needed without overhead — allowing the organization to increase capacity utilization by at least 15%.
- **Accelerated delivery by slashing delivery times, recapturing $1.4 million in additional end user productivity.** Using vRealize Automation, interviewees slashed deployment timelines for new VMs from one to two weeks down to 17 - 45 minutes, with most organizations reaching deployment times at or below 30 minutes. This lets end users (developers, testers, DevOps, and support engineers) begin work almost immediately, increasing user productivity, application release velocity, change rates, and ultimately driving future business success.
- **Reduced deployment issues and prevented major incidents, saving $825,545 in IT and end user labor costs.** Organizations curtailed the prevalence of failed or incorrect deployments through automation, as human error was removed from the process. Further, better resource allocation, governance, and faster deployment and retirement cycles led to resource optimization, saving infrastructure costs but also improving performance, dependability, and availability.
- **Established strong governance to ensure compliance and security, saving $410,884 in auditing and reporting labor.** Automation ensured that all actions: followed governance procedures; mostly eliminated human error; and enabled detection and quick resolution of noncompliant environments with little to no human intervention.

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ROI
101%

Benefits PV
$8.9 million

NPV
$4.4 million

Payback
16 months

Unquantified benefits. Interviewed organizations experienced the following benefits, which are not quantified for this study:

- Strengthened the security posture and reduced compliance risk.
- Facilitated consistent global deployments and management across sites.
- Enhanced customer support by providing support engineers the environments they needed to begin work almost immediately.
- Simplified patching, saving labor costs and increasing frequency — leading to better security and performance.
- Curbed shadow IT by delivering speed and flexibility with automation.
- Enabled agility by preventing technical debt and allowing employees to focus on new features rather than keeping the lights on.
- Accelerated sales by enabling faster POC creation.
- Enriched end user experience by reducing wait times, improving performance, and preventing downtime.
- Replaced legacy and homegrown automation solution costs.

Costs. The following are the composite organization's three-year, risk-adjusted PV costs based on the four interviewed customers:

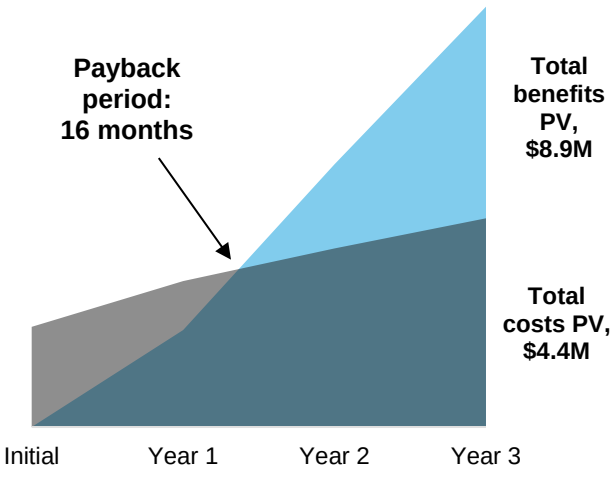
- Implementation and management costs of $1.9 million.
- VMware licensing and support costs of $2.5 million.

Flexibility. Interviewed organizations gained the following future options:

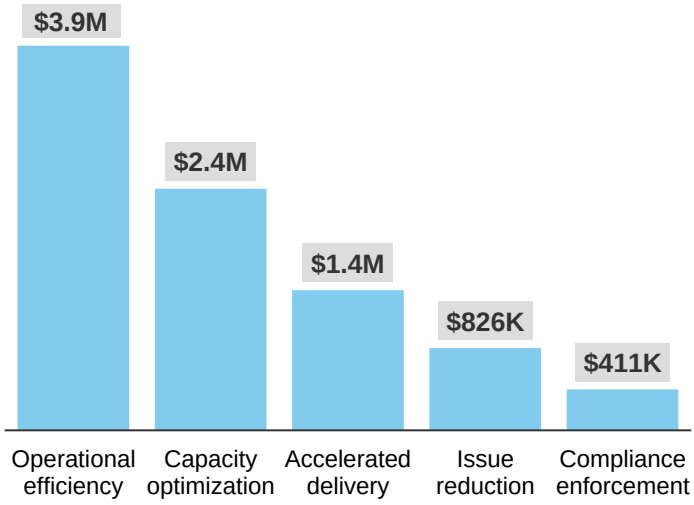
- Build a culture of automation that extends beyond infrastructure teams.
- Diminish configuration drift to reduce labor costs, improve compliance, and strengthen security.
- Enable development of the CI/CD pipeline to accelerate the business.
- Launch new capabilities and advanced use cases.

Forrester's interviews with four existing customers and subsequent financial analysis found that the composite organization based on these four interviewed organizations experienced benefits of $8,917,245 over three years versus costs of $4,427,932, adding up to a net present value (NPV) of $4,489,313 and an ROI of 101%.

Financial Summary



Benefits (Three-Year)



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TEI Framework And Methodology

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

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 vRealize Automation can have on an organization:

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

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

CUSTOMER INTERVIEWS
Interviewed four organizations using vRealize Automation to obtain data with respect to costs, benefits, and risks.

COMPOSITE ORGANIZATION
Designed a composite organization based on characteristics of the interviewed organizations.

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

CASE STUDY
Employed four fundamental elements of TEI in modeling VMware vRealize Automation'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 vRealize Automation Customer Journey

BEFORE AND AFTER THE VREALIZE AUTOMATION INVESTMENT

Interviewed Organizations

Forrester interviewed the following four current VMware vRealize Automation customers for this study:

INDUSTRY	REGION	SIZE	INTERVIEWEES	IT ENVIRONMENT
Healthcare technology	Global, based in North America	25K to 50K FTEs $5B to $10B in revenue	• Senior director of IT • Manager and senior systems architect	• 10K VMs, 2,000% annual churn • 200 hosts • 10 data centers • 5+ petabytes of storage • 4K IT FTEs • 1K developer end users
B2B software	Global, based in North America	1K to 5K FTEs $1B to $5B in revenue	• Senior engineer • Systems administrator	• 10K VMs, 260% annual churn • 300 hosts • 2 data centers • 300 IT FTEs • 1.1K developer end users
Healthcare services	North America	50K+ FTEs $15B+ in revenue	• IT director and enterprise architect	• 10K VMs, 50% annual churn • 400 hosts • 2 data centers • 12 petabytes of storage • 1.8K IT FTEs • 60 IT end users
Healthcare services	North America	1K to 5K FTEs $5B to $10B in revenue	• Director of DevOps and cloud services • Platform engineer • Systems engineer	• 2.7K VMs • 270 hosts • 3 data centers • 4 petabytes of storage • 450 IT FTEs • 250 developer end users

Key Challenges

Interviewees cited key challenges stemming from manual processes that led to their investments in vRealize Automation:

› **Rampant human error, overprovisioned resources, and poor governance.** Without automation, errors were common and led to failed deployments, security and compliance risks, and poor performance and downtime issues. One healthcare services company faced a host of issues before automation, such as poor governance, excess manual errors, and overlapping requests and poor capacity management where teams "stepped on each other's toes." Users were logging into vCenter for server deployment and their overlapping requests caused resource issues, errors, and complaints. The IT manager and enterprise architect explained, "No one knew how to manage capacity, and the OS team was struggling to provide enough resources."

› **IT teams could not meet speed and labor demands.** Teams could not keep up with business needs, there simply wasn't enough time in

> "People would check out three environments in order to get one that works. It made us extremely overallocated, and then things would start failing because nodes weren't responding fast enough. Everyone was upset, and it snowballed on itself."
>
> *Senior director of IT, healthcare technology*

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the day. Legacy manual processes also slowed application delivery and support ticket resolution, as developers and testers waited weeks for environments to begin work. "We have to manage 'the surge,'" explained the healthcare technology company's manager and senior systems architect. They continued: "In one of our use cases, our certification organization needs to conduct regression testing where automation runs against new code and checks mass quantities of environments. For this testing, we need to deploy 500 VMs within 1 to 3 hours, destroy them, and then rinse and repeat. We needed a solution that could maintain that pace, and that's part of why we worked closely with VMware and vRealize Automation because they can handle the throughput."

"Dependability is the real money maker. Builds and configurations are consistent from the start. Human error is eliminated across many server lifecycle management steps, and it has created a far more dependable environment."

IT director and enterprise architect, healthcare services

Deployment

Interviewees used VMware vRealize Automation to accomplish a range of technical and business goals:

- The healthcare technology company created self-service automation to deploy and retire application environments for developers and testers. The manager and senior systems architect explained, "With vRealize Automation, we developed a spin-up and spin-down approach where each individual or team can click a button and get an isolated copy of our application environment to work on without impacting each other." They continued: "Our team tests each of our solutions broadly with major releases, and then on a per-client and per-site basis wherever an application is deployed. Our testing focuses on performance, scalability, high availability, total cost of ownership, and resource consumption. We also provide services to engineering, like providing shared and individual development environments and executing testing pipelines. We also run the code pipelines, which crank out code 24 hours a day."
- The B2B software company created a shopper list where the end user picks an operating system and desired software components, and vRealize Automation does the back end set up and installation. This self-service capability is used for R&D engineers, application developers, support engineers, and developers that build proof of concepts (POCs) as part of the sales process.
- One healthcare services organization used vRealize Automation to automate both on-premises and public cloud environments as infrastructure-as-a-service (IaaS). Using vRealize Automation, the organization automated deployment, Day 2 operations, and retirement, though requests are still routed through IT for approval and to kick off automation rather than a pure self-service approach.
- Another healthcare services organization automated infrastructure deployment with self-service for application engineers and developers. Additionally, IT used vRealize to consolidate environments and drive more consistent governance across the business.

"vRealize Automation hasn't just made us faster, it's made us more stable and secure. We're building trust with end users to know that when they make a request, all the automation will work behind the scenes and their system will be ready quickly. It's taken a lot of doubt and fear out of the request process. Plus, it gave us the stability and ability to failover in a way that doesn't impact end users. It creates a big chain of trust."

Senior engineer, B2B software

"vRealize Automation has made a much more scalable, stable, and agile environment with more consistency across the applications we deploy. It's increased productivity and shortened time-to-deployment."

Platform engineer, healthcare services

Key Results

The interviews revealed that key results from the investment in VMware vRealize Automation include:

- Avoided labor costs for IT with automation.
- Improved utilization of infrastructure resources.
- Accelerated application development, testing, and support.
- Reduced the amount of human errors through automation.
- Enhanced performance, availability, and dependability.
- Tightened security and compliance thanks to strong governance.
- Improved experience for IT teams, end users, and customers.
- Business agility and the spread of automation beyond infrastructure.

All four interviewees identified that vRealize Automation was a worthwhile investment with a positive ROI. The B2B software systems administrator summed it up: "We spent several million dollars developing our virtualization and automation, but we're talking about supporting 10,000 environments at a given time. It's unimaginable to go back to the way things were, and that is nothing compared to the years of profit and growth it's given us."

"Productivity and end user experience are definitely much better on the day-to-day [with vRealize Automation]."

Senior director of IT, healthcare technology

"Culture has shifted with automation because people think about servers differently. They don't think in terms of days anymore; now, they just click a couple buttons and its ready in 30 minutes."

IT director and enterprise architect, healthcare services

Composite Organization

Forrester aggregated findings from the four interviewed organizations to create a composite organization and an associated TEI financial analysis to model the financial impact of VMware vRealize Automation.

The composite organization is a large, global enterprise based in the United States that manages an environment of 8,000 virtual machines and is growing at a rate of 25% annually, reaching 10,000 virtual machines by Year 1. The composite organization's deployments were performed manually, and the IT department struggled to keep up. Resources were poorly utilized with significant allocated environments sitting unused. Human error was common, leading to wasted labor, long wait times, and out-of-compliance environments.

The composite organization implements vRealize Automation to create a self-service portal for end user developers to request environments. It fully automates the deployment, Day 2 activities, and the retirement of virtual machines using vRealize Automation. Automation helps to rightsize and recapture significant resources, slowing the growth rate of infrastructure costs from 25% down to 5%, enabling developers to do more work, more quickly.

Key assumptions:
Global enterprise, based in the US with 10,000 virtual machines, that implements vRealize Automation to significantly reduce IT labor, improve governance, accelerate delivery, and reduce resource waste.

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	Operational efficiency	$988,200	$1,830,256	$1,921,884	$4,740,341	$3,854,912
Btr	Capacity optimization	$558,000	$1,188,000	$1,242,000	$2,988,000	$2,422,224
Ctr	Accelerated delivery	$392,700	$647,955	$680,381	$1,721,036	$1,403,680
Dtr	Issue reduction	$221,497	$389,626	$402,200	$1,013,324	$825,545
Etr	Compliance enforcement	$101,088	$202,176	$202,176	$505,440	$410,884
	Total benefits (risk-adjusted)	$2,261,485	$4,258,013	$4,448,641	$10,968,140	$8,917,245

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 composite organization expects risk-adjusted total benefits to be a PV of more than $8.9 million.

Operational Efficiency

The primary economic benefit realized by the interviewed vRealize Automation customers was a significant improvement in IT operational efficiency. In the past, it took significant labor from multiple IT teams (infrastructure, operating system, applications, etc.) to deploy an environment, complete Day 2 operations, and retire an environment. Requests took one to two weeks to complete due to the manual steps and handoffs involved; by automating these tasks with vRealize Automation and building a self-service portal for developer end users, these manual labor demands were completely eliminated. Employees could focus on other pressing tasks, and the organization could support massive growth without significant additional hiring. Further, automation drastically increased the efficiency of lifecycle management, i.e., organizations avoided significant labor that would otherwise be needed to support the churn.

- The B2B software company described how they are now turning over 26,000 virtual machines per year supported by only 11 IT administrators. Without vRealize Automation, they estimate that they'd need over 50 administrators to support this level of churn, avoiding a five times increase in IT labor costs. Given the complexity of its environments, automating these builds saves several weeks of man hours per environment — leading to massive savings.
- For one healthcare services company, end users used to submit a ticket to the help desk, who passed it to the IT service management team, who then passed it to the server team. Server administrators manually had to deploy the template, install and account for different agents, join the domain, find the IP address, verify storage, validate resources, and assign roles and features — requiring 3 to 4 hours per virtual machine. With vRealize Automation, end users request a VM through a self-service portal, which automatically deploys the VM with no employee involvement in 45 to 60 minutes. The company now enables application engineers and developers to create short-term VMs, which was not previously possible. Ultimately, automation enabled the server team to focus on other elements of their job, with a

"Prior to introducing vRealize Automation, the idea of providing infrastructure as code for developers was not something that we were willing to broach due to audit and compliance needs. It was left to the server team to do all the server builds across the organization. Now, with vRealize Automation, our audit and compliance tools are part of the recipe and we can offer infrastructure as code and self-service tools to the organization."

Systems engineer, healthcare services

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constant workload and no additional hiring neccesary while the company undergoes significant growth.

- Another interviewed healthcare services company drove huge labor savings with vRealize Automation. Each server deployment now requires only 3 minutes of labor instead of 160 minutes, along with hours saved for Day 2 operations and retirement. It reallocated 4.5 FTEs out of its six-person team for deployments; reallocated 1 FTE for its 11-person operating system team while also doubling their output; avoided three additional FTEs for infrastructure; and its six-person storage team now manages three times the capacity along with additional technologies without more labor. Two other teams, with 19 FTEs, charged to operating systems, networking, and beyond have now taken on significantly more work and delved into containerization and high-performance computing without expanding their teams.

  First, the healthcare services company automated compute, storage, OS, network, and tooling (monitoring and backups). The team next moved to full virtual machine deployment, network, and layered operating system (OS), and then turned to automating the QA process. Next came automating the retirement lifecycle to automatically clean up the storage, network, domain name systems (DNS) records, active directory records, and other components, and finally, the company turned to advanced Day 2 operations.

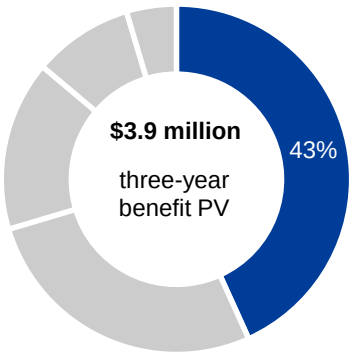
The modeled composite organization drastically increases its VM churn rate from only 10% to 50% with vRealize Automation — interviewees reported a wide range with churn rates as high as 2,000% annually (see the Capacity Optimization section for more details) — and also sees an additional 5% year-over-year (YOY) increase in the volume of virtual machines. This means that the environment is seeing turnover with up to 6,000 VMs being created and 5,500 VMs being destroyed annually by Year 3.

Without automation, as the churn rate increases, IT headcount would have needed to increase dramatically in order to handle the massive growth in deployments, Day 2 activities, and retirements demanded by the organization. And if they failed to keep up with retirement demands, the total volume of virtual machines and associated resource costs would otherwise increase far beyond 5%. Forrester's model measures actual labor hours savings of 2.5 hours per deployment, 2 hours for Day 2 activities (applied to half of the environments), and 2.5 hours for retirement. These avoided labor hours are evaluated at an estimated fully burdened labor cost of $61 per hour, based on a $94,000 per year salary with a 35% burden rate for additional costs of employment.

There are several risk factors that may impact the actual financial value of this benefit for organizations:

- Actual number of environments created and retired annually, especially pertaining to the churn rate and total volume of virtual machines.
- The amount of time previously required for these tasks, which would vary based on the complexity of these tasks for an organization.
- Average salary for IT employees completing these tasks.

To account for these risks, Forrester adjusted this benefit downward by 10%, yielding a three-year, risk-adjusted total PV of $3.9 million.



Operational efficiency: **43%** of total benefits

"We allowed our users to put in a request to automate different operations. We evaluated the ROI for each request based on the number of times the task would have been executed and how much time would be saved, and all but one request showed a positive ROI – with nearly every instance giving us a positive ROI in less than 30 days. This means that the amount of time it took us to write the automation was returned in hours saved in under a month for almost every task."

IT director and enterprise architect, healthcare services

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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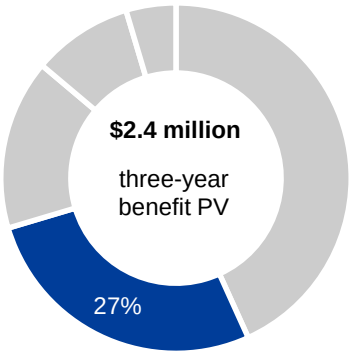
Operational Efficiency: Calculation Table					
REF.	**METRIC**	**CALC.**	**YEAR 1**	**YEAR 2**	**YEAR 3**
A1	Total number of VMs	Assumption	10,000	10,500	11,025
A2	Environment growth rate	Customer interviews	5%	5%	5%
A3	Churn rate of VMs	Customer interviews	30%	50%	50%
A4	Number of VMs deployed	A1*(A2+A3)	3,500	5,775	6,064
A5	Number of VMs retired	A1*A3	3,000	5,250	5,513
A6	Hours avoided for deployment	Customer interviews	2.5	2.5	2.5
A7	Percent that require Day 2 activities	Assumption	50%	50%	50%
A8	Hours avoided for Day 2 activities	Customer interviews	1	2	2
A9	Hours avoided for retirement	Customer interviews	2.5	2.5	2.5
A10	Total hours avoided	(A4*A6)+(A4*A7*A8)+(A5*A9)	18,000	33,338	35,007
A11	Fully burdened cost per hour for a senior systems administrator	$94,000*(1+35%)/2080	$61	$61	$61
At	Operational efficiency	A10*A11	$1,098,000	$2,033,618	$2,135,427
	Risk adjustment	↓10%			
Atr	Operational efficiency (risk-adjusted)		$988,200	$1,830,256	$1,921,884
Three-year, risk-adjusted present value of operational efficiency					$3,854,912

Capacity Optimization

The second major benefit of automation was that organizations quickly discovered and could automate the retirement of unused, allocated resources. Previously, VMs would sit for months or years beyond the time they were no longer used, holding back the creation of other environments and potentially necessitating further infrastructure spend to handle growth.

By reclaiming capacity, organizations optimized their resource spend and delivered greater business value and growth for the same cost. Further, as developers became accustomed to the speed and accuracy of their environment requests, organizations found that they tended to request more accurately sized environments rather than overestimating their needs to avoid waiting for weeks for a new environment if their needs changed later on.

Churn rate is used to represent the increased utilization of the environment, which measures the number of servers deployed versus servers retired. Implementing automation drove increased usage; yet, it can also eliminate waste. Keeping the number of total virtual machines constant while increasing the churn rate means that more work is being done, e.g., driving business value, while avoiding an increase in IT labor (since more deployments and retirements are occurring despite the constant environment size) and without needing to implement additional infrastructure resources.



Capacity optimization: **27%** of total benefits

"[vRealize Automation] allows us to see who is using the system for what, and lets us have the difficult conversations to ensure correct usage."

Manager, sr. systems architect, healthcare technology

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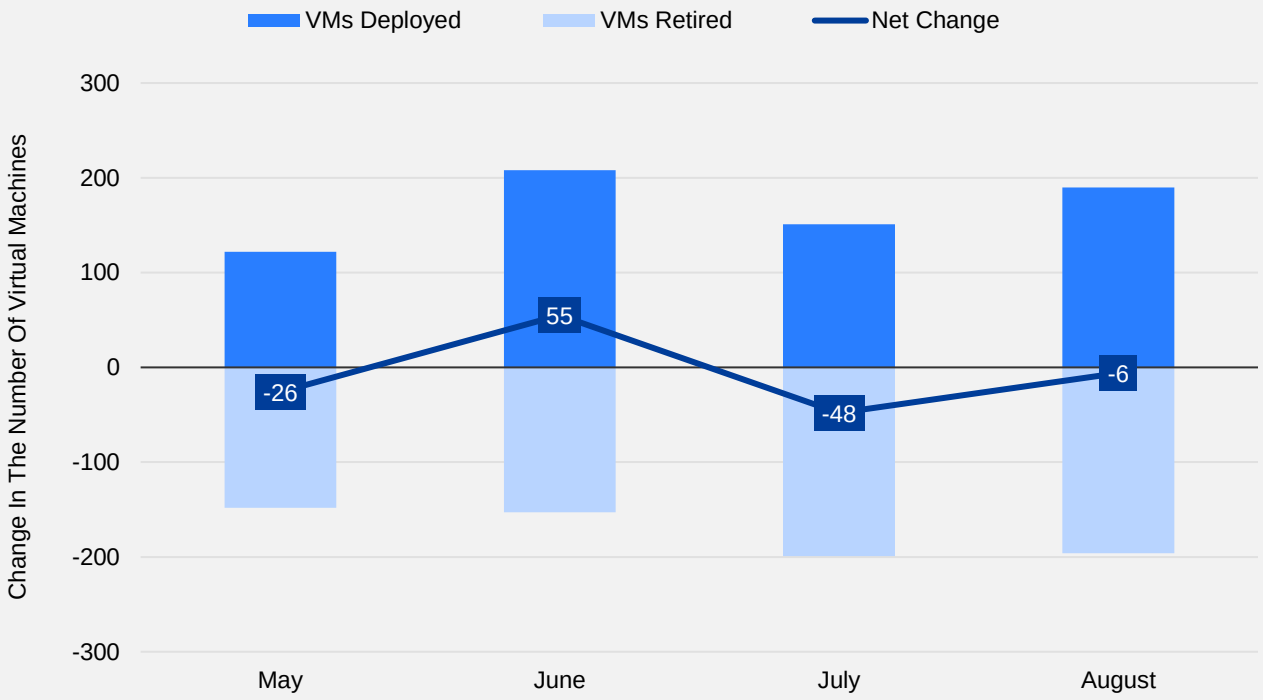
How A Healthcare Services Company Is *Going Nowhere, Mighty Fast*

The IT director and enterprise architect for a healthcare services company shared how, after implementing vRealize Automation, both deployment and retirement activity spiked without consuming more resources. They explained: "Our server churn rate grew tremendously after automation. We didn't know how much waste we previously had. When we saw hundreds of servers being deleted after implementing automation, month over month, it was amazing. Waste was leaving as real workloads came in at the same time. This means we created a spike in activity without a spike in growth, so we naturally used our existing equipment more efficiently." The infrastructure is *going nowhere* as resource consumption is not increasing, but from a business perspective, employees are delivering more value and doing so *mighty fast*.

The following chart illustrates this agility with a recent four-month period where almost 1,400 virtual machines were either created or destroyed while the overall environment size decreased marginally.

Healthcare Services Virtual Machine Lifecycle Over Four Months



The IT director and enterprise architect expanded on the organization's experience:

"It seems like the whole world has changed in our IT organization [with vRealize Automation]. Teams don't really deploy servers in the same way. Now that we were automating, we expected to see more builds — and we were right. But what we did not expect to see was people giving their old servers back. We did not anticipate the psychology of our users changing.

In the past, it was so difficult to get a server. Our users held on to them because they were so difficult to get. After the process became automated, and after about a year of customers having such an easy time getting new servers with reduced friction, all the old servers started being retired.

I was surprised because we were trending growth, but then growth seemed to start slowing down. We were actually seeing massive churn with huge amounts of new servers being built and huge amounts of old servers being retired. So, we were not only allowing users to build more rapidly, we were purging rapidly.

Showing how many servers are being retired and built is a representation of actual work; it's deceiving if you just look at the current server count. This means our users are doing more work than ever before, but also, it's a massive cost savings if you look at how many IT hours are saved with every build, every Day 2 operation, and every retirement, especially since they used to do these manually."

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In addition to the highlighted healthcare services company, the other three interviewees all described resource optimization benefits:

- The healthcare technology company reclaimed hundreds of VMs and aims to reduce total volume by 33% with automation. Increased trust from users was key; deployment issues previously led users to request redundant resources to ensure they would have what they needed without waiting an extra cycle if an issue occurred. As they gain trust in the system, the company is seeing an automatic rightsizing effect as users realize they no longer need to ask for more than they need. Another major factor in savings has been providing templates that give users only the nodes they need, rather than assigning the same large cluster regardless of the request.
- The B2B software company was able to recapture $500,000 of resources for additional work by reorganizing the environment and retiring dormant virtual machines. Automation enabled them to quickly identify and retire resources that were no longer needed, making resources more reusable as measured by increasing churn rate. With showback costs from $300 well into the thousands, the associated cost savings were significant.
- Another healthcare services company is shifting away, wherever possible, from mostly permanent VMs to short-term environments lasting between one day and two weeks, with the IT team hoping to not only reduce resource waste but to also provide higher performing environments with the savings.

"[Users] were checking out multiple copies of a virtual machine before because of the issues we had. [With vRealize Automation], the number of VMs will shrink because things function better now. We will actually be able to give users more RAM per VM as a result."

Senior director of IT, healthcare technology

"We create disposable environments that last between one day and two weeks. We are continually creating new masters with the newest versions of our code, and so we need to regularly retire the old environments, destroy its children, and deploy a new master."

Systems engineer, healthcare services

The composite organization's optimization of resources is evaluated based on the increase in VM churn rate (also seen in the Operational Efficiency benefit), which increased from 5% before automation to 50% after automation. Since not all new environments necessarily represent new value as they could be simply replacing the workload of a former environment, Forrester has measured only 15% of the 40% increase in churn as increased capacity utilization. In comparison to the total number of servers (417 in Year 1 growing to 460 servers in Year 3, calculated by assuming 12 VMs per CPU and two CPUs per server), the composite organization avoids purchases of 166 servers over the three-year financial analysis at a cost avoidance of $20,000 per server.

As the percent optimization achieved, the total size of the environment, and the average cost per server may vary, Forrester adjusted this benefit downward by 10% for a three-year, risk-adjusted total PV of $2.4 million.

Capacity Optimization: Calculation Table

REF.	METRIC	CALC.	YEAR 1	YEAR 2	YEAR 3
B1	Total number of servers	Composite organization	417	438	460
B2	Resource optimization	Customer interviews	7.5%	15%	15%
B3	Number of new servers avoided	B1*B2 (rounded)	31	66	69
B4	Cost per server	Forrester estimate	$20,000	$20,000	$20,000
Bt	Capacity optimization	B3*B4	$620,000	$1,320,000	$1,380,000
	Risk adjustment	↓10%			
Btr	Capacity optimization (risk-adjusted)		$558,000	$1,188,000	$1,242,000
Three-year, risk-adjusted present value of capacity optimization					$2,422,224

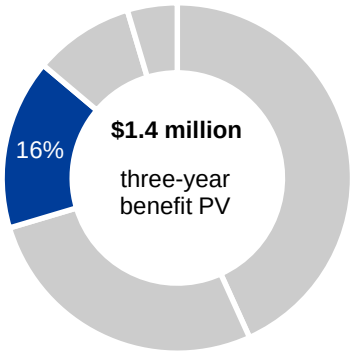
Accelerated Delivery

Using vRealize Automation, the interviewed organizations cut the time to deploy a new VM from being between one to two weeks to between 17 and 45 minutes, with most organizations reaching deployment times at or below 30 minutes. This meant that development teams now had the resources they needed right away, rather than having to plan for at least one to two weeks out (and even more if deployments came out wrong the first time due to human error). Further, developers could focus on doing smaller, faster, more incremental work in a continuous delivery approach, as the IT organization could quickly provision and retire whatever systems they needed to do so. Ultimately, developers saved time and delivered greater productivity value to the organization, accelerating releases of and improvements to the company's offerings.

Interviewees each discussed how vRealize Automation accelerated delivery for their organization:

- The healthcare technology company shortened its application release cycle from six weeks to four weeks with automation for its certification organization — a 33% improvement — impacting hundreds of developers on a bimonthly basis. The manager and senior systems architect elaborated: “Our certification organization used to need six weeks for validation tasks they complete every two months. With vRealize Automation, they've cut the timeline down by two weeks and the results are more stable. And since this validation can have about 130 environment instances with five nodes each live at a given time being used by probably 100 testers, it’s a big time savings.”
- The B2B software company has slashed the time from request to deployment of virtual machines from one to two weeks to an average of 17 minutes with vRealize Automation. They’ve now enabled automated nightly builds that keep applications continually updated while also minimizing downtime during release to only a couple of minutes in the evening. It used to require almost one month to build and release into production, now it only takes a couple of hours. The company can now also build R&D environments with “all of the bells and whistles” in under 2 hours, instead of taking days of labor.
- One healthcare services organization slashed deployment timeframes from seven business days to only 30 minutes, removing significant blockers to developers. This improved their application release velocity, with features promoted from the development queue to production faster, benefiting the business and customers alike.
- The other healthcare services organization reduced a three-to-five day turnaround for environment requests to being less than 1 hour with vRealize Automation. The organization increased application release velocity exponentially, with the “change rate” of application updates going from dozens per week to hundreds. According to the systems engineer: “Change rate is the primary way to quantify how we’ve accelerated development. How rapidly are we releasing changes to applications compared to a few years ago? We were talking a handful before, and now we’re talking hundreds thanks to automation.”

In modeling this benefit, Forrester measured a 40-hour reduction in time spent waiting for an environment. Developers are assumed to have lost only 10% of those hours as wasted productivity while waiting (since they will complete other tasks while waiting), with hours recaptured at a $66 fully burdened hourly rate based on a $102,000 annual salary plus a



Accelerated delivery: **16%** of total benefits

“We’re getting users services quicker [with vRealize Automation], which means that project timelines are moving more rapidly. Users have been able to move through projects far more quickly because infrastructure services no longer hold them back — IT is no longer in the way of application development.”

IT director and enterprise architect, healthcare services

“Application release velocity is one of the most important outcomes of automation. It shows the time it takes from something entering the development backlog to it being released in production. From a business perspective, this shows how quickly an idea or feature request becomes a reality.”

Systems engineer, healthcare services

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35% burden rate for other costs of employment. Since not all time saved will necessarily be used productively, Forrester recaptured only 50% of time saved by end user developers for added business value.

The value of this benefit will vary for organizations based on:

- Number of VMs deployed annually.
- Length of wait time reduced from request to fulfillment.
- Actual level of productivity lost while waiting.
- Titles and average salaries of end users.

To account for these risks, Forrester adjusted this benefit downward by 15%, yielding a three-year, risk-adjusted total PV of $1.4 million.

Accelerated Delivery: Calculation Table

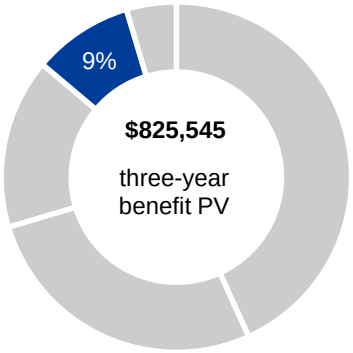
REF.	METRIC	CALCULATION	YEAR 1	YEAR 2	YEAR 3
C1	Number of VMs deployed	A4	3,500	5,775	6,064
C2	Reduced hours elapsed from request to deployment	Customer interviews	40	40	40
C3	Percent of time wasted waiting	Customer interviews	10%	10%	10%
C4	End user hours saved per request	Customer interviews	4	4	4
C5	Total hours saved by developer end users	C1*C4	14,000	23,100	24,256
C6	Fully burdened cost per hour for a senior developer	$102,000*(1+35%)/2080	$66	$66	$66
C7	Percent of hours saved for developer end users recaptured for business value	Assumption	50%	50%	50%
Ct	Accelerated delivery	C5*C6*C7	$462,000	$762,300	$800,448
	Risk adjustment	↓15%			
Ctr	Accelerated delivery (risk-adjusted)		$392,700	$647,955	$680,381
Three-year, risk-adjusted present value of accelerated delivery					$1,403,680

Issue Reduction

Organizations slashed the prevalence of failed or incorrect deployments through automation as human error was removed from the process. If a request needed to be resubmitted or a deployment reattempted, IT labor would have been wasted recreating the environment. Further, developers would have had to wait again for the environment they originally requested, which was typically another one to two weeks after the first one-to-two-week waiting period. With vRealize Automation, the vast majority of these issues were eliminated, leading to labor savings for both IT teams and end users.

Further, better resource allocation, governance, and faster deployment and retirement cycles led to resource optimization — saving infrastructure costs (as seen above) while also improving performance, dependability, and availability. Where overallocation or deployment issues previously ground environments to a halt, automation ensured the environment was dependable by reducing the number of downtime incidents.

It boils down to dependability, explained the healthcare services' IT manager and enterprise architect: "Dependability is the real money



Issue reduction:
9% of total benefits

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maker. Builds and configurations are consistent from the start. Human error has been eliminated in so many steps within server lifecycle management, [and] has created a far more dependable environment."

Specific benefits identified by interviewees include:

- The healthcare company faced major issues where its homegrown automation regularly overprovisioned resources, crashing the environments monthly. The manager and senior systems architect elaborated: "With the old system, if we didn't pay attention and missed reviews for a week or two, we'd end up overprovisioned. Our systems are really RAM-intensive. We'd reach 200% utilization, and then everything would come to a grinding halt. This was at least a monthly occurrence where we had to turn off the whole system because of poor performance. With vRealize, we get an alarm when it reaches 90% and it stops provisioning at 98%. This stops us from impacting developers and testers, and it saves us from difficult conversations to determine who is less important and needs to have their system turned off."
- The B2B software company improved performance and availability, ultimately reducing the number of major incidents per year and the average number of users impacted per incident. Furthermore, automation enabled IT teams to resolve incidents faster, shortening the average length and reducing wasted productivity.
- One of the healthcare services organizations increased the success rates of deployments from less than 80% to 95%+ through automation, as human error and risk of attempting to overprovision resources was eliminated from the process. Further, the organization increased environment availability through better governance, preventing user-impacting issues.
- The other healthcare services organization also cut down on human error and improved capacity management, driving better availability and performance. The IT director and enterprise architect explained: "Workload placement is no longer a function of an uninformed [user], rather, it is managed based on actual capacity. This has eliminated overprovisioning and accidental resource overallocation." He also described how this benefited application availability: "With the proper distribution of resources, there is indeed less application impact now that resource constraints are a thing of the past."

Forrester modeled automation's impact for the composite organization on reduced issues from failed or incorrect virtual machines with a reduction in failure rate from 20% to 3%, saving 2.5 hours of IT labor and 4 hours of wasted developer time. The composite organization is also modeled as eliminating bimonthly issues completely, saving 160 hours of IT labor for resolution and 4 hours of time savings per affected end users (at 20% of total end users impacted) for each downtime incident. The impact of this benefit will vary based on:

- Current error rates and achieved reductions with automation.
- Labor needed to deploy environments and fix downtime incidents.
- Hours lost for end users waiting for environments per request.
- Number of users impacted and length of downtime incidents.
- Level of pay for IT staff and end users.

To account for these risks, Forrester adjusted this benefit downward by 10%, yielding a three-year, risk-adjusted total PV of $825,545.

"vRealize Automation can cap resources in use. We used to manually monitor resources a few times a week, but now, automation can shut off on its own if we hit capacity. Users are much happier because they're not working on overprovisioned or overburdened systems, it just works better."

Manager, sr. systems architect, healthcare technology

"We've decreased the volume of major incidents, who's impacted, and how long they're impacted over the last couple of years. Now, we can build and stage our applications in a way that our downtime is less impactful."

Systems administrator, B2B software

"With vRealize Automation, we increased our deployment success rate to the high nineties from around 80% with our old processes."

Manager, sr. systems architect, healthcare technology

"We didn't realize how many human errors existed before, but we've realized that, 'Wow! We just don't see them anymore.' The errors are gone, and people aren't making mistakes anymore, so we forgot about them."

IT director and enterprise architect, healthcare services

Issue Reduction: Calculation Table					
REF.	**METRIC**	**CALCULATION**	**YEAR 1**	**YEAR 2**	**YEAR 3**
D1	Number of VMs deployed	A4	3,500	5,775	6,064
D2	Percent of failed or incorrect deployments due to human error before automation	Customer interviews	20%	20%	20%
D3	Percent of failed or incorrect deployments after vRealize Automation	Customer interviews	3%	3%	3%
D4	IT hours required per redeployment	A6	2.5	2.5	2.5
D5	**IT hours saved by reducing human error**	D1*(D2-D3)*D4	1,488	2,454	2,577
D6	Developer end user hours saved per redeployment by preventing failed deployments	C4	4	4	4
D7	**End user hours saved by reducing human error**	D1*(D2-D3)*D6	2,380	3,927	4,124
D8	Number of downtime incidents prevented annually	Customer interviews	3	6	6
D9	IT hours required to resolve a downtime incident	Customer interviews	160	160	160
D10	**IT hours saved for incident resolution**	D8*D9	480	960	960
D11	Number of developer end user FTEs impacted	20% of end users	60	60	60
D12	Lost productivity hours per user	Customer interviews	8	8	8
D13	**End user hours saved by preventing incidents**	D8*D11*D12	1,440	2,880	2,880
D14	Total IT hours saved	D5+D10	1,968	3,414	3,537
D15	Fully burdened hourly cost for sr. systems admin	$94K/yr + 35% burden	$61	$61	$61
D16	IT cost savings	D14*D15	$120,048	$208,254	$215,757
D17	Percent of hours saved for developer end users recaptured for business value	Assumption	50%	50%	50%
D18	Total developer end user hours saved	(D7+D13)*D17	1,910	3,404	3,502
D19	Fully burdened cost per hour for a senior developer	$102K/yr + 35% burden	$66	$66	$66
D20	Developer cost savings	D18*D19	$126,060	$224,664	$231,132
Dt	Issue reduction	D16+D20	$246,108	$432,918	$446,889
	Risk adjustment	↓10%			
Dtr	Issue reduction (risk-adjusted)		$221,497	$389,626	$402,200
Three-year, risk-adjusted present value of issue reduction					$825,545

Compliance Enforcement

Automating deployment, Day 2 operations, and system retirement led to a significantly higher degree of compliance with strong preestablished governance procedures and reduced human error. Further, automation could detect and act on out-of-compliance environments quickly with minimal to no human intervention. And finally, teams enjoyed greater visibility and data tracking than before. These factors combined to reduce the labor needed to conduct audits and resolve compliance issues.

> "Instead of manual work to protect the environment, [with vRealize Automation], the environment protects itself."
>
> *Manager, sr. systems architect, healthcare technology*

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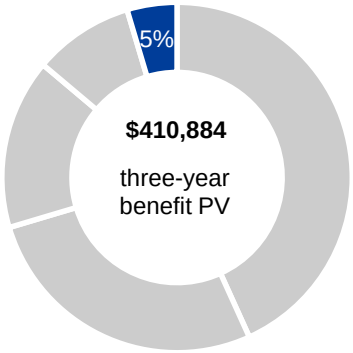
Compliance, governance, and security were essential to interviewees:

- For example, the B2B software company narrowed down over 1,000 excessive, poorly controlled images into a small selection of core builds with a shopper list of needed capabilities in vRealize Automation. This excess volume of images could not be regularly updated or examined, and many were far out of compliance with regulatory and security needs. The new automation-enabled approach ensured that end users got what they needed, while also establishing better governance of the environments that are being created.
- An interviewed healthcare services organization found automation to be essential to catching noncompliant environments and ensuring future deployments exactly matched specifications. "We have tight governance now," explained the IT director and enterprise architect. "Servers can no longer be built between the cracks, whereas before a human ran the scripts and added a server to a patch group. If they didn't, it might not be found for quite a while. We also now have the automation tools to audit environments now, which we couldn't do at all before. We knew noncompliant environments existed because we stumbled across them every day, but we couldn't systematically find them. Now, our vulnerability reports come out green because we're keeping our systems clean."
- Compliance was a key decision driver for the other healthcare services organization identified, as the platform engineer described: "Security and compliance is a main reason we wanted vRealize Automation. Security and compliance are a requirement; we have to remain very conscious and maintain security as a top-tier company. In everything we do, security is the first step. vRealize Automation incorporates security into the blueprints and recipes, making it an easy ask for engineers — it becomes the default function."

Forrester modeled this benefit for the composite organization as a savings of 1.5 FTEs per year that phases in over a two-year period (as automation is deployed and becomes trusted).

Potential risks of variation that may impact this benefit include specific industry compliance demands, the prevalence of issues in the prior environment, and the number and pay for compliance employees.

To account for these risks, Forrester adjusted this benefit downward by 10%, yielding a three-year, risk-adjusted total PV of $410,884.



Compliance enforcement: **5%** of total benefits

> "We had hundreds of noncompliant servers, and users dragged their feet getting off unsupported [platforms] because it was so difficult to get a new server. Automation improved compliance; servers are deployed quickly so it's much easier for users to stay compliant. All new builds are automatically put into the right patch group and audited so nothing slips through the cracks. We've reduced risk and tightened our security posture, while maintaining consistency across builds."
>
> *IT director and enterprise*

Compliance Enforcement: Calculation Table

REF.	METRIC	CALCULATION	YEAR 1	YEAR 2	YEAR 3
E1	Hours saved for compliance	1 FTE	1,040	2,080	2,080
E2	Hours saved for auditing	1 FTE @ 50%	520	1,040	1,040
E3	Total hours saved	E1+E2	1,560	3,120	3,120
E4	Average fully burdened cost per hour for an IT audit manager	$111K/yr+35% burden	$72	$72	$72
Et	Compliance enforcement	E3*E4	$112,320	$224,640	$224,640
	Risk adjustment	↓10%			
Etr	Compliance enforcement (risk-adjusted)		$101,088	$202,176	$202,176
Three-year, risk-adjusted present value of compliance enforcement					$410,884

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Unquantified Benefits

Interviewees noted additional benefits that could not be quantified for the composite organization due to lacking metrics or benefits that were only applicable to one or two organizations. Unquantified benefits included:

- **Strengthened security posture and reduced compliance risk.** Governance's impact on compliance and security is far from just labor savings, it has a major impact on reducing business risk of breaches or fines. While the discrete value of this reduced risk was not quantifiable for interviewees, they stressed that it was one of the single most important benefits they achieved with vRealize Automation.
- **Facilitated consistent global operations.** Managing across sites poses significant challenges for an IT organization working to strengthen governance while ensuring adequate performance. vRealize Automation had a major impact, helping to deploy and manage IT across global sites.

  The director of DevOps and cloud services at a healthcare services organization explained: "vRealize Automation helps us be a multisite enterprise. It used to take three times the work for a developer to deploy across our three sites. If it took them 4 hours to build a server, that meant it was actually 12 hours of work. With vRealize Automation, that's no longer the case. It's the same amount of work regardless of how many sites you deploy because of the recipes and inputs. vRealize Automation is the one-stop-shop."

  The manager and senior systems architect at a healthcare technology company echoed this benefit: "vRealize Automation has the capability to deploy across our departments and data centers [globally]. This helps us reduce costs and latency for our international teams. It improves international testers' quality of life, since they don't have to worry about their packets crossing the ocean every time."
- **Enhanced customer support.** Using vRealize Automation, organizations were able to provide faster and more effective support to customers. For each client-submitted support ticket at the B2B software company, support engineers need to spin up a lookalike environment to reproduce and diagnose the issue. Instead of having an IT employee manually create each environment, wasting labor and forcing the support team to wait a week before they can start to resolve the issue, this can now be done automatically. Support engineers can begin work on tickets almost immediately, even in real time, such as on the phone with a client. "The faster we can give an environment to our support team, the faster they can respond to our customers," explained the systems administrator. Savings were massive: "Instead of a thousand support agents, we only need a couple hundred support staff because of the speed [enabled by vRealize Automation]. The savings are exponential." Not only does this save massive labor costs, it also improves client experience as their issues are resolved much more quickly. This improves customer experience, trust, and retention.
- **Simplified patching.** Regular updates could be delivered with minimal administrator labor using the help of automation. For example, the healthcare technology company described how an average patch could be done with one button rather than 6 hours of manual labor.
- **Curbed shadow IT.** The B2B software company's systems administrator described how the improved speed and flexibility of

> "vRealize Automation helps us be a multisite enterprise. It used to take three times the work for a developer to deploy across our three sites. If it took them 4 hours to build a server, that meant it was actually 12 hours of work. With vRealize Automation, that's no longer the case: it's the same amount of work regardless of how many sites you deploy because of the recipes and inputs. vRealize Automation is the one-stop shop."
>
> *Director of DevOps and cloud services, healthcare services*

The B2B software company's support engineers can do the work of over 1,000 FTEs with several hundred employees thanks to automation.

> "Now we can quickly spread patches and release new versions using vRealize Automation. It's saving me a lot of time and keeping things more secure. It allows us to patch more frequently without impacting users."
>
> *Senior director of IT, healthcare technology*

automation led teams to abandon their shadow IT (technology investments outside of IT's control): "We had several teams using shadow IT, but once they saw how our [first] development groups used [vRealize Automation], they started transitioning over from their shadow IT because they didn't want to deal with the infrastructure and wanted our side to do it."

- **Enabled agility by preventing technical debt.** Automation helps to ensure things are done right the first time, enabling employees to work on new things rather than fixing old ones. "vRealize Automation has permitted so many things to be done for the first time," explained the IT director and enterprise architect for a healthcare services company. He continued: "It helps avoid technical debt and permits IT to become cloud-like. It also helps employees gain the skills they need to further their career all while increasing our operational scale."
- **Accelerated sales.** A typical sales process for the B2B software company requires building a working proof of concept (POC). With vRealize Automation, they no longer have to wait a week to have access to an environment to begin work on the POC. Presenting POCs faster saves internal labor costs, but more importantly, it enhances the sales process by helping to close deals faster.
- **Enriched end user experience.** Less time waiting, combined with better performance and availability naturally increased satisfaction among end users and even customers. While discrete measurement was not possible, interviewees indicated that employee and customer retention metrics could be positively influenced by automation.
- **Replaced legacy automation solution costs.** Organizations that replaced homegrown or alternative third-party automation solutions with vRealize Automation were able to eliminate solution fees and administrative labor for the legacy solutions. For the healthcare technology company, this translated to a 50% time savings across three IT administrators.

> "vRealize Automation has permitted so many things to be done for the first time. It helps avoid technical debt and permits IT to become cloud-like. It also helps employees gain the skills they need to further their career all while increasing our operational scale."
>
> *IT director and enterprise architect, healthcare services*

> "We have solid customer growth year over year, with retention rates and level of usage and spending all improving. Automation is an important part of that. We're resolving issues much faster, which means that customers are more likely to use our product and do so more often."
>
> *Senior engineer, B2B software*

Flexibility

REAL FLEXIBILITY OPTIONS IDENTIFIED BY INTERVIEWED CUSTOMERS

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

- **Building a culture of automation.** Successes with vRealize Automation helped inspire other teams to look at their own workloads for opportunities. The IT director and enterprise architect at a healthcare services company explained such a transformation: "We've started to build a culture of automation in our other IT divisions as they see our team's success. For example, our security and enterprise orchestration teams have now partnered to build new firewall rules, inspections, and load balancers. We're even starting to see automation cross-pollinate to other business divisions outside of IT."
- **Automating testing and release staging as part of a CI/CD pipeline.** Multiple interviewees, such as the software and healthcare technology companies, cited vRealize Automation as an essential ingredient in their development of a CI/CD pipeline. The director of DevOps and cloud services for a healthcare services company described how it became the backbone for further development: "As we've matured and grown, vRealize Automation has become primarily the service catalog infrastructure management tool for IaaS. It's very extensible to integrate with other tools, such as those in the CI/CD pipeline. It's very important to manage the infrastructure, and it lets us implement other user-facing tools as we continue to improve our pipeline."
- **Launching new capabilities.** Growing expertise and awareness of automation led to advanced use cases involving Kubernetes, public cloud, and orchestration platforms. For example, the healthcare technology company extended vRealize Automation via APIs, while the B2B software company utilized API calls to hook into its own, third-party automated solutions. This helped end users manage their environments while gaining efficiency. Others took it even further: "We've gotten creative and started doing anything-as-a-service (XaaS)," shared the healthcare services company's IT director and enterprise architect. He continued, "We're building services using vRealize Automation that have nothing to do with VMware or virtualization, and are making new features [based on these services]."
- **Diminishing configuration drift.** Companies can adopt additional vRealize capabilities in combination with third-party tools to manage and monitor configurations to further reduce labor, improve compliance, and strengthen security. For example, an interviewed healthcare services organization used vRealize Automation in combination with other tools to counteract configuration drift. Over time, if the environment isn't properly monitored or documented, configurations begin to vary more and more (especially when combined with human error). Now, with environments the same across locations, the organization has faster failover and a reduction in the number of tickets related to configurations.

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

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.

"We're transitioning to a CI/CD pipeline. Historically, someone had to go to a webpage and say, 'I want to check out an environment of this configuration.' We would then have a notebook of scripts that they would run against that — a literal three-ring notebook — to run against that environment and validate that the test executed, and then go on to the next test."

Senior director of IT, healthcare technology

"Prior to introducing vRealize Automation, the idea of providing infrastructure as code for developers was not something that we were willing to broach due to audit and compliance needs. It was left to the server team to do all the server builds across the organization. Now, with vRealize Automation, our audit and compliance tools are part of the recipe and we can offer infrastructure as code and self-service tools to the organization."

Systems engineer, healthcare services

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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	Implementation and management	$861,142	$439,111	$421,687	$421,687	$2,143,627	$1,925,655
Gtr	VMware licensing and support	$1,264,200	$631,050	$411,600	$431,550	$2,738,400	$2,502,277
	Total costs (risk-adjusted)	$2,125,342	$1,070,161	$833,287	$853,237	$4,882,027	$4,427,932

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 composite organization expects risk-adjusted total costs to be a PV of more than $4.4 million.

Implementation And Management

Interviewees began incurring costs when they decided to explore automation. Resource hours were initially incurred for evaluation, scoping, and contracting for automation technologies and partners. Once selected, organizations dedicated IT resources to learn to use vRealize Automation and implement it across the environment. Forrester interviewed large organizations for this study, each dedicating a blend of internal and third-party resources over a period of nine to 15 months for initial implementation.

Interviewees cited VMware's powerful capabilities and good interface, but automation is still not completely simple. The B2B software company's systems administrator said: "You have to learn a lot of things like methods and get over the learning curve. Building automation is pretty much a giant puzzle where you have to put together the pieces."

Yet, customers found that with the interface and upgrade process improved significantly, making the learning curve smaller and smaller. As the IT director and enterprise architect for the healthcare services organization explained: "In the early days of automation, we had some pain. When we moved to version 6.x of vRealize Automation we saw some improvements, and my goodness, 7.x has had a massive reduction in complexity. Now, managing multiple vRealize Automation environments is so much simpler with the 7.x version."

The composite organization is modeled for a large environment with 10,000 virtual machines and a global presence. It uses vRealize Automation to implement a fully automated, self-service system for deployment, Day 2 activities, and retirement of VMs for developer end users. Over a one-year period, the composite organization dedicates three solutions architects to implementation along with professional services and part-time support from 12 IT administrators. During this time, employees are trained on vRealize Automation and perform the various tasks required for integrations, automated deployments, and creation of self-service portals — all while establishing strong governance throughout to ensure compliance and security.

After implementation was complete, the composite organization dedicated two full-time vRealize Automation administrators along with minor support from other IT administrators to:

- Continually support, update, and optimize the automation.

9-to-15 month implementation of self-service portals and virtual machine deployment automation.

- Maintain the hardware and software.
- Report on activities and plan future strategy.
- Train new employees.
- Create new automation deployments.
- Follow up on alerts.

Readers should note that costs are modeled for a very large environment and will likely be significantly lower for most small and midsize implementations. Labor costs will vary depending on:

- The size and scope of implementation.
- The level of customization desired.
- Average salary for involved employees.
- Need for professional services expertise and labor.

To account for these risks, Forrester adjusted this cost upward by 10%, yielding a three-year, risk-adjusted total PV of $1.9 million.

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.

Implementation And Management: Calculation Table

REF.	METRIC	CALCULATION	INITIAL	YEAR 1	YEAR 2	YEAR 3
F1	Hours for due diligence		160	0	0	0
F2	Hours for IT implementation, development, and management	3 FTE initial, 2 FTE Y1+	6,240	4,160	4,160	4,160
F3	Fully burdened cost per hour for a solutions architect	$122K/r + 35% burden	$79	$79	$79	$79
F4	Development and administration costs	(F1+F2)*F3	$505,600	$328,640	$328,640	$328,640
F5	Hours for cross-functional implementation and development	12 FTE @ 10% initial, 4 FTE @ 10% Y1+	2,496	832	832	832
F6	Fully burdened cost per hour for a senior systems administrator	$94K/yr + 35% burden	$61	$61	$61	$61
F7	Cross-functional IT costs	F5*F6	$152,256	$50,752	$50,752	$50,752
F8	Hours for developer end user training	300 FTE * 1 hr, 20% churn	0	300	60	60
F9	Fully burdened cost per hour for a senior developer	$102K/yr + 35% burden	$66	$66	$66	$66
F10	Developer training costs	F8*F9	$0	$19,800	$3,960	$3,960
F11	Internal labor costs	F4+F7+F10	$657,856	$399,192	$383,352	$383,352
F12	Professional services		$125,000	$0	$0	$0
Ft	Implementation and management	F11+F12	$782,856	$399,192	$383,352	$383,352
	Risk adjustment	↑10%				
Ftr	Implementation and management (risk-adjusted)		$861,142	$439,111	$421,687	$421,687
Three-year, risk-adjusted present value of implementation and management costs						$1,925,655

VMware Licensing And Support

Costs for VMware vRealize Automation include perpetual licensing and annual maintenance fees. Forrester assumes the composite organization implements vRealize Automation across 8,000 VMs in Year 0, during the implementation period, and an additional 2,000 in Year 1, with 5% YOY growth in Years 2 and 3. Licenses are a one-time cost and are estimated using a ratio of 12 VMs per CPU and isolating only the cost of vRealize Automation out of the total vRealize Suite Advance pricing (as only the benefits of automation are measured). Support costs are incurred annually as based on total license spend for the environment.

Licensing and maintenance costs will vary based on:

- The size of the virtualized environment in terms of VMs, CPUs, and other resource needs.
- The specific features and capabilities needed.
- Any preexisting licensing contracts with VMware.

To account for potential variation, Forrester adjusted this cost upward by 5%, yielding a three-year, risk-adjusted total PV of $2.5 million.

VMware Licensing And Support: Calculation Table

REF.	METRIC	CALC.	INITIAL	YEAR 1	YEAR 2	YEAR 3
G1	Licensing costs		$1,204,000	$300,000	$76,000	$79,000
G2	Support costs		$0	$301,000	$316,000	$332,000
Gt	VMware licensing and support	G1+G2	$1,204,000	$601,000	$392,000	$411,000
	Risk adjustment	↑5%				
Gtr	VMware licensing and support (risk-adjusted)		$1,264,200	$631,050	$411,600	$431,550
Three-year, risk-adjusted present value of VMware licensing and support costs						$2,502,277

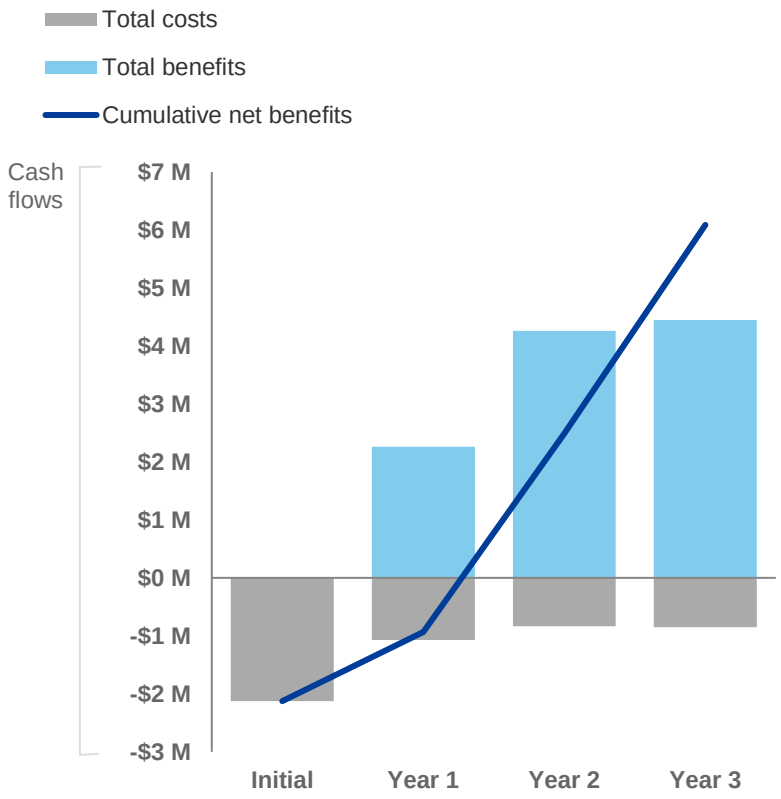
The following information is provided by VMware. Forrester has not validated any claims and does not endorse VMware or its offerings.

To learn more about VMware vRealize Automation, please visit https://www.vmware.com/products/vrealize-automation.html.

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	($2,125,342)	($1,070,161)	($833,287)	($853,237)	($4,882,027)	($4,427,932)
Total benefits	$0	$2,261,485	$4,258,013	$4,448,641	$10,968,140	$8,917,245
Net benefits	($2,125,342)	$1,191,324	$3,424,726	$3,595,404	$6,086,113	$4,489,313
ROI						101%
Payback period						16 months

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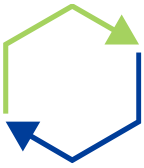
Appendix A: Total Economic Impact

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.