

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

The Total Economic Impact™ Of VMware Tanzu Application Service*

Cost Savings And Business Benefits
Enabled By VMware Tanzu Application
Service

*Formerly the Pivotal Platform

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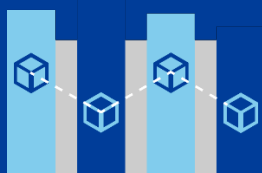
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Benefits And Costs



Increased revenue from faster cycle times:

\$6.1 million



Developer productivity improvement:

Developers are 80% more efficient with Tanzu Application Service



Tanzu Application Service cost over three years:

\$10.9 million

Executive Summary

In the increasingly competitive digital technology space, organizations need a way to gain an advantage in their quest to secure and retain customers. As a 2019 Forrester report states, “Using software, hardware, algorithms, and the internet, digital business leaders find that it’s 10 times cheaper and faster to engage customers and deliver outcomes that their customers value.”¹ To reach these customers, organizations rely on their developers to write and produce code to get their digital assets in front of customers as soon as possible. Yet many organizations struggle to deliver these assets. In a survey of developers, 60% of respondents stated they release applications twice a year or less.² This inhibits their ability to adapt to the ever-changing needs of their customers and limits their ability to provide the timely, quality services that extend customer lifetime value.

VMware provides a software development solution named the VMware Tanzu Application Service that helps its customers speed application delivery. Tanzu Application Service (TAS) enables developers to create and deliver software faster by automatically deploying application code to an elastic, scalable, and fully managed cloud infrastructure platform. The automation, security, and scalability features not only shorten software release times but simplify and automate technology operations as well.

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

To better understand the benefits, costs, and risks associated with this investment, Forrester interviewed several customers with years of experience using TAS. Prior to investing in TAS, customers struggled with disparate development solutions and sought to automate their development pipeline while increasing the efficiency of their developers. The combination of these drivers led these organizations to look for a platform to speed up and modernize their application delivery methods.

Key Findings

Quantified benefits. The following risk-adjusted present value (PV) quantified benefits are representative of those experienced by the companies interviewed:

- › **Developers spend 5x less time building and debugging environments with TAS.** Migrating applications to TAS streamlines the application repair and development process. Developers can significantly reduce the amount of time they spend building and debugging application environments. Developers experience significant time savings, which have a present value of nearly \$10.8 million over three years.
- › **Shorter cycle times enable revenue-generating applications to be available to customers for two additional weeks.** Organizations can increase the speed and frequency of their release cycles. This allows organizations to make updates to revenue-generating applications available for an additional number of days, leading to \$6.2 million in additional revenue over three years.



ROI
142%



Benefits PV
\$26.3 million



NPV
\$15.4 million

- › **TAS reduces the amount of downtime for business-critical applications, leading to more than \$5.4 million in savings over three years.** Applications migrated to TAS have fewer incidents of downtime each year than those in legacy environments. This reduces the amount of time organizations spend remediating these events and reduces the impact to business operations.
- › **Automated security patching allows organizations to reduce the amount of time their operations teams spend deploying patches by more than 75%.** TAS eliminates the need for planned downtime or off-hours work to deploy security patches. These formerly labor-intensive patches are now deployed automatically through the platform, and staff formerly responsible for this task are able to spend their time doing more valuable work.
- › **Moving workloads from traditional on-premises infrastructure to TAS allows organizations to retire legacy infrastructure.** Before TAS, interviewees maintained several nonproduction staging environments for each application stack. With the TAS, they eliminate many of these unnecessary and duplicative environments. The three-year present value of this cost savings is approximately \$2.0 million.

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

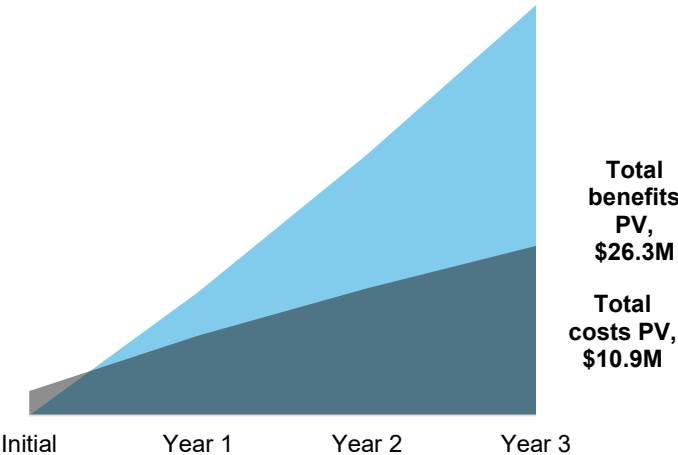
- › **Using TAS in their development pipelines makes organizations more desirable places to work.** Eliminating many menial and repetitive tasks from developer workstreams improves their overall employee experience. Some customers reported that they have been able to lower their attrition rates with their TAS investments.

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

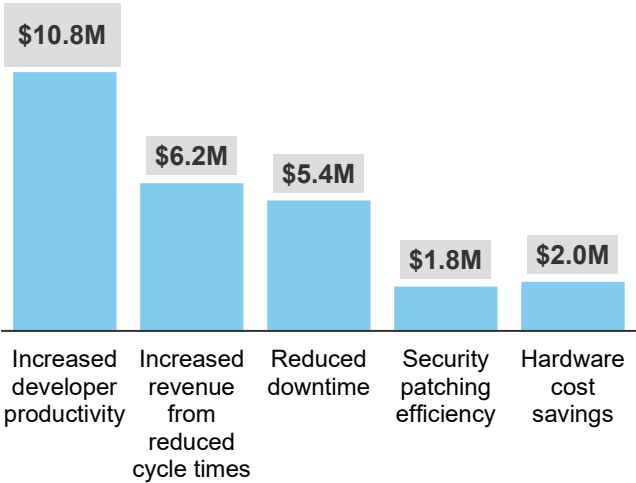
- › **Cost to implement TAS across the organization.** Customers reported that implementing TAS across their organizations was a relatively quick process that only required a small team of developers and operations staff to dedicate four months to the implementation of the solution.
- › **The cost to use TAS.** Customers purchase an annual subscription for their use of TAS. Subscription costs are calculated based on the total number of application instances running on TAS.
- › **VMware professional services.** VMware offers a consulting service called VMware Tanzu Labs. Tanzu Labs provides an immersive environment to help its customers successfully implement continuous delivery and other DevOps practices to promote and ensure more successful outcomes from using TAS. Customers also used Tanzu Labs Modern Application Development services to build new applications and streamline their application modernization processes.
- › **Developers and operations staff spent time training to use and manage TAS.** Interviewed organizations reported that developers needed minimal training to start to see the benefit of TAS. This training time remains consistent as more developers are onboarded to the solution. Additionally, three full-time employees are dedicated to the ongoing management of the system.

Forrester's interviews with four existing customers and subsequent financial analysis found that an organization based on these interviewed organizations experiences benefits of \$26,281,160 over three years versus costs of \$10,861,555, adding up to a net present value (NPV) of \$15,419,505 and an ROI of 142%.

Financial Summary



Benefits (Three-Year)



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

TEI Framework And Methodology

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

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 Tanzu Application Service can have on an organization:



DUE DILIGENCE

Interviewed VMware stakeholders and Forrester analysts to gather data relative to Tanzu Application Service.



CUSTOMER INTERVIEWS

Interviewed four organizations using Tanzu Application Service 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 Tanzu Application Service'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.

DISCLOSURES

Readers should be aware of the following:

This study is commissioned by VMware and delivered by Forrester Consulting. It is not meant to be used as a competitive analysis.

Forrester makes no assumptions as to the potential ROI that other organizations will receive. Forrester strongly advises that readers use their own estimates within the framework provided in the report to determine the appropriateness of an investment in Tanzu Application Service.

VMware reviewed and provided feedback to Forrester, but Forrester maintains editorial control over the study and its findings and does not accept changes to the study that contradict Forrester's findings or obscure the meaning of the study.

VMware provided the customer names for the interviews but did not participate in the interviews.

Tanzu Application Service Customer Journey

BEFORE AND AFTER TANZU APPLICATION SERVICE INVESTMENT

Interviewed Organizations

For this study, Forrester conducted four interviews with TAS customers. Interviewed customers include the following:

INDUSTRY	REGION	REVENUE	DEVELOPERS USING THE PLATFORM
Sports manufacturing	Headquartered in the US	\$8.5 billion	400 to 450
IT services	Headquartered in the US	\$49.1 million	60 to 75
Financial services	Headquartered in the US	\$86.1 billion	500 to 600
Financial services	Headquartered in Canada	\$17.0 billion	500 to 1,000

Key Challenges

The interviewed organizations experienced common challenges prior to investing in TAS, including:

- › **Multiple solutions for developers and operations creating inefficiencies that made it difficult to scale.** Prior to investing in TAS, organizations noticed that disparate workflows for developers and operations staff led to inefficiencies in the development pipeline. These inefficiencies made it difficult for the organizations to scale their workflows as they grew. The senior vice president of software operations for the IT services organization shared: “I don’t want our app developers to have to essentially branch features or code. I don’t want operational people to have different operational paths and playbooks for different cloud offerings. When I want to deploy something, I want to deploy it the same way on any of those.”
- › **Highly manual delivery processes.** Legacy development workflows and solutions were inefficient and relied on a large amount of manual labor. Developers wasted significant time waiting for test and production environments to be deconstructed. As a result, developers were often held up and unable to focus on writing code due to large amounts of downtime.
- › **Inefficient operations processes.** Customers reported that their operations staff were burdened with TASK of building and maintaining development environments. Much like the development pipeline, this was a highly labor-intensive process. One interviewee stated: “The primary reason we switched to the VMware Tanzu Application Service was their ability to maintain the underlying platform while increasing velocity. In our legacy world, there were virtual machines that people have to log in to and manage, which was a very time-consuming and inefficient process.”

“The primary reason we switched to TAS was their ability to maintain the underlying platform while increasing velocity. In our legacy world, there were virtual machines that people have to log in to and manage, which was a very time-consuming and inefficient process.”

Principal engineer, financial services



Key Results

The interviews revealed several key results from their TAS investments:

- › **Productivity gains for developers lead to increased developer satisfaction.** With the automation provided by TAS, organizations eliminate many manual processes formerly required to move code to production. This saves significant time during the development process. Developers can eliminate many noncoding admin tasks and focus instead on development of new features. They spend less time waiting for tasks to be completed and more time writing code, which makes them both more efficient and more satisfied with their jobs. Organizations no longer have different operational paths and playbooks for different offerings. Developers have one consistent way of working, which makes it easy to scale quickly and efficiently.
- › **Automated security patching eliminates downtime and reduces the labor needed to perform patches.** Using TAS allows organizations to automate their formerly time-intensive patching process. Prior to using TAS, application teams frequently planned instances of downtime on the weekends to deploy security patches to the operating system and application dependencies without disturbing operations during peak business hours. Investing in TAS allows organizations to automate their patching processes and avoid these costly instances of downtime.
- › **Reduced downtime incidents.** In addition to downtime caused by patching, organizations found that in their legacy development environments, they would regularly encounter bugs or other errors that would result in lengthy periods of unplanned downtime. Using TAS, staff can catch bugs in the development process more proactively and make repairs to applications without needing to take them down, which saves the organization significant time and money.
- › **Reduced cycle times.** Interviewees described how TAS allows them to make releases more frequently and efficiently than they could in their legacy environments. Releases on TAS are of a higher quality and do not contain the same issues as they used to. This enables organizations to release updates to critical customer-facing applications sooner, enabling organizations to generate more revenue from them as a result.
- › **Cost savings associated with streamlined environments.** By eliminating many steps associated with moving applications to production and moving to automated self-service environment creation, interviewed companies see cost savings by eliminating duplicate or unneeded environments and their associated software and hardware costs.

Composite Organization

Based on the interviews, Forrester constructed a TEI framework, a composite company, and an associated ROI analysis that illustrates the areas financially affected. The composite organization is representative of the four companies that Forrester interviewed and is used to present the aggregate financial analysis in the next section. The composite organization that Forrester synthesized from the customer interviews has the following characteristics:

“So, usually, when you talk to developers, they’ll tell you at least half their time is spent wasted on finding an environment, debugging an environment. All those environmental concerns, and now they don’t have any of that.”

*Vice president of SAS
operations, IT services*



“We have several million dollars in cost avoidance using reclaimed hardware. Right now, we have 800 servers that we have for eCommerce, and we’ve been able to cannibalize a lot of that hardware for the nonproduction and production eCommerce environments.”

*Vice president of customer
technology, sports manufacturing*



Description of composite. The composite organization is a global, multibillion-dollar organization with 30,000 employees. The organization faced the same challenges as the interviewed organizations: the desire to automate its development pipeline and operations processes, the need to become more efficient in delivery processes, and the desire to consolidate solutions to eliminate inefficiencies associated with managing multiple delivery solutions.

Deployment characteristics. The organization began by deploying TAS to 300 of its developers and onboards 50 additional developers annually. By Year 3, 400 developers are fully onboarded to TAS with the plan to continue expansion. In addition to the developers using TAS, the composite organization has approximately 10 operational engineers monitoring TAS. The organization has a total of 350 business applications and migrates 75 of these applications to TAS in Year 1. For this study, we define an application as a software program or group of programs that execute business logic on behalf of end users or other applications. Of the applications migrated to TAS in Year 1, six are considered customer-facing, revenue-generating applications. The organization migrates an additional revenue-generating application to TAS each year.



Key assumptions

400 developers using TAS by Year 3

10 operations staff using TAS

8 revenue-generating applications by Year 3

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	Increased developer productivity	\$3,201,120	\$4,357,080	\$5,690,880	\$13,249,080	\$10,786,644
Btr	Increased revenue from reduced cycle times	\$2,142,000	\$2,499,000	\$2,856,000	\$7,497,000	\$6,158,317
Ctr	Reduced downtime	\$1,991,124	\$2,200,716	\$2,410,308	\$6,602,148	\$5,439,786
Dtr	Security patching efficiency	\$642,200	\$770,640	\$834,860	\$2,247,700	\$1,847,953
Etr	Hardware cost savings	\$712,500	\$831,250	\$950,000	\$2,493,750	\$2,048,460
	Total benefits (risk-adjusted)	\$8,688,944	\$10,658,686	\$12,742,048	\$32,089,678	\$26,281,160

Increased Developer Productivity

Interviewees highlighted several different ways in which Tanzu Application Service makes their developers more efficient:

- › Prior to implementing TAS, administrative tasks regularly bogged down the interviewed organizations' developers, who spent a significant amount of time waiting for activities to be completed that were outside of their control, including system performance remediation and creation of development environments. With TAS, the developers can focus on producing code for deployment, thereby allowing them to develop more applications, plug-ins, and pieces of code to be tested and eventually released. One interviewee shared, "When you talked to developers, they would tell you at least half their time was wasted on finding and debugging an environment. I don't have those environmental concerns now. So, I would say, conservatively developers save half their time; they've gained 2x productivity based on just that."
- › The vice president of customer technology for a sporting goods retailer highlighted this notable increase in efficiency: "Developers don't have to spend time waiting on changes or waiting for environments to be readily available. With the environments set up, they can just go off and work. Now, they don't have to worry about the infrastructure whatsoever. They can just develop code."

For the composite organization, Forrester assumes:

- › The composite organization onboards 300 developers in Year 1 and adds an additional 50 developers each year.
- › Prior to using TAS, these developers spent 10 hours per week building and debugging environments. By shifting the responsibility of building environments to TAS, each developer saves 8 hours per week by Year 3.
- › Not all saved time is repurposed for additional work. To capture the value of repurposed time, Forrester conservatively assumes a 50% productivity capture.
- › The average fully loaded hourly compensation for developers is \$72, or \$150,000 annually. Forrester uses national averages to derive salary

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 nearly \$26.3 million.

"When you talked to developers, they would tell you at least half their time was wasted on finding and debugging an environment. I don't have those environmental concerns now. So, I would say, conservatively developers save half their time; they've gained 2x productivity based on just that."

Principal engineer, financial services



estimates and applies a 30% increase to capture the value of benefits in total compensation.

This benefit will vary based on the following risk factors:

- › The number of developers who are onboarded to TAS.
- › The workflows for creating and debugging environments in legacy environments.

To account for these risks, Forrester adjusted this benefit downward by 5%, yielding a three-year risk-adjusted total PV of \$10,786,644.

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.

Increased Developer Productivity: Calculation Table

Ref.	Metric	Calculation	Year 1	Year 2	Year 3
A1	Number of developers using TAS	Interviews	300	350	400
A2	Time spent building and debugging environments prior to TAS (hours per week)	Interviews	10	10	10
A3	Time spent building and debugging environments with TAS (hours per week)	Interviews	4	3	2
A4	Developer time saved by using TAS (hours per week)	A2-A3	6	7	8
A5	Average hourly fully loaded developer compensation	Assumption	\$72	\$72	\$72
A6	Productivity capture	Assumption	50%	50%	50%
At	Increased developer productivity	$A1 \times A4 \times A5 \times A6 \times 52$	\$3,369,600	\$4,586,400	\$5,990,400
	Risk adjustment	↓5%			
Atr	Increased developer productivity (risk-adjusted)		\$3,201,120	\$4,357,080	\$5,690,880

Increased Revenue From Reduced Cycle Times

Interviewees highlighted several ways in which TAS reduces application cycle times:

- › Utilizing a continuous integration and delivery approach to application deployment with TAS results in significantly shorter times from code testing to production deployment. The speed and automation provided by TAS enable organizations to release updates and bug patches to their applications faster, which increases their availability to customers, driving additional revenue. The vice president of customer technology at one interviewed organization stated: “Before, we would have to wait for these long cycles, especially for the non-eCommerce-related teams where they have maybe a release per quarter or maybe a few years. Now we are driving value to our customers sooner.”
- › With the automation TAS provides, developers can dedicate more time to writing code, which eliminates most, if not all, bugs before the app is live. Issues that were introduced can now be remediated faster than they could in legacy systems, allowing these revenue-generating applications to be deployed sooner than they could be in legacy environments.

For the composite organization, Forrester assumes:

- › The organization migrates six revenue-generating applications during its initial migration period. The organization migrates one additional revenue-generating app each year.

“Before, we would have to wait for these long cycles, especially for the non-eCommerce-related teams where they have maybe a release per quarter or maybe a few years. Now we are driving value to our customers sooner.”

Vice president of customer technology, sports manufacturing

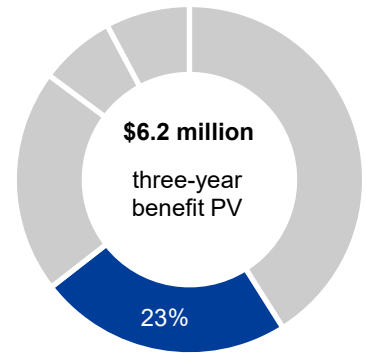


- › Each app generates an average revenue of \$3 million weekly.
- › With the increased velocity of release cycles enabled by TAS, the composite organization can make its revenue-generating applications available for an additional two weeks each year.
- › The composite organization has an average operating margin of 7%.

The increase in revenue from reduced cycle times will vary with:

- › The number of revenue-generating applications that are migrated to TAS and the revenue generated per week from these applications.
- › The speed at which organizations perform releases prior to investing in TAS.
- › The operating margin of an organization, which will vary greatly based on a variety of factors.

To account for these risks, Forrester adjusted this benefit downward by 15%, yielding a three-year risk-adjusted total PV of \$6,158,317.



Increased revenue from reduced cycle times: 23% of total benefits

Increased Revenue From Reduced Cycle Times: Calculation Table

Ref.	Metric	Calculation	Year 1	Year 2	Year 3
B1	Number of revenue-generating applications on TAS	Interviews	6	7	8
B2	Estimated revenue per week from revenue-generating applications	Interviews	\$3,000,000	\$3,000,000	\$3,000,000
B3	Number of weeks of additional revenue due to faster time-to-market with shorter cycle times	Interviews	2	2	2
B4	Incremental revenue	B1*B2*B3	\$36,000,000	\$42,000,000	\$48,000,000
B5	Operating margin	Assumption	7%	7%	7%
Bt	Increased revenue from reduced cycle times	B4*B5	\$2,520,000	\$2,940,000	\$3,360,000
	Risk adjustment	↓15%			
Btr	Increased revenue from reduced cycle times (risk-adjusted)		\$2,142,000	\$2,499,000	\$2,856,000

Reduced Downtime

Interviewees highlighted several different ways in which TAS reduces the amount of downtime for their applications:

- › Since investing in TAS, organizations mitigate or eliminate many factors that cause instances of unplanned downtime. Automated patching, reducing the number of bugs in production, and reducing the mean-time-to-remediate those bugs lead to fewer and less impactful instances of downtime. In legacy systems, these downtime events could prove costly to remediate — both in terms of labor needed to address the issue and the direct business impact of having an application offline. One customer stated: “Downtime is very customer-impacting. We often had issues that we would vet out and find that we’d have to rebuild environments, which was a very manual process.”
- › Another interviewee added: “Our eCommerce applications are probably the best example. We would perform updates every two weeks. We were probably introducing as many bugs as we were in features. It took another two weeks to remediate the issues we introduced. Sometimes if it was a significant critical issue, the time to

fix the issue would result in hundreds of thousands of dollars in lost revenue.”

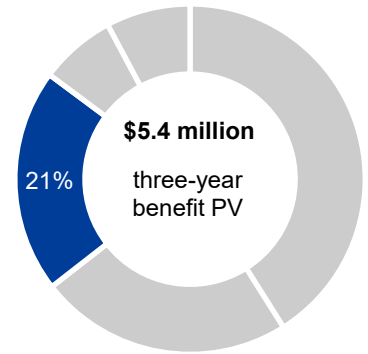
For the composite organization, Forrester assumes:

- › Prior to investing in TAS, the composite organization experienced 24 incidents of unplanned downtime annually. Shifting applications to TAS allows the organization to avoid 19 of these instances in Year 1. As developers become more accustomed to the platform and new DevOps processes, they increase the number of instances avoided to 23 by Year 3.
- › Each instance of downtime involves 15 staff on average. This team is comprised of both operations personnel and developers. The average hourly compensation of these employees is \$68.50.
- › The mean-time-to-remediate an instance of downtime is 16 hours.
- › On average the business impact of a downtime event is approximately \$100,000, which is inclusive of lost revenue, additional costs to “catch up” after downtime, and any effects from a decrease in customer satisfaction.

The reduction in costs associated with downtime will vary with:

- › The number of downtime events experienced by the organization and the mean-time-to-remediate these events.
- › The size of the team required to remediate incidents of downtime.
- › The business impact to an organization, which will vary greatly based on the type of application experiencing downtime, the industry of the organization, and the revenue associated with each application.

To account for these risks, Forrester adjusted this benefit downward by 10%, yielding a three-year risk-adjusted total PV of \$5,439,786.



**Reduced downtime: 21%
of total benefits**

Reduced Downtime: Calculation Table

Ref.	Metric	Calculation	Year 1	Year 2	Year 3
C1	Downtime incidents each year prior to TAS	Interviews	24	24	24
C2	Downtime incidents each year with TAS	Interviews	5	3	1
C3	Downtime incidents avoided with TAS	C1-C2	19	21	23
C4	Mean-time-to-remediate (hours)	Interviews	16	16	16
C5	Number of staff required per incident	Interviews	15	15	15
C6	Average hourly fully loaded developer/operations compensation	Assumption	\$68.50	\$68.50	\$68.50
C7	Cost savings to remediate downtime events	C3*C4*C5*C6	\$312,360	\$345,240	\$378,120
C8	Business impact per downtime event	Interviews	\$100,000	\$100,000	\$100,000
C9	Business impact avoided with fewer downtime events	C3*C8	\$1,900,000	\$2,100,000	\$2,300,000
Ct	Reduced downtime	C7+C9	\$2,212,360	\$2,445,240	\$2,678,120
	Risk adjustment	↓10%			
Ctr	Reduced downtime (risk-adjusted)		\$1,991,124	\$2,200,716	\$2,410,308

Security Patching Efficiency

Interviewees highlighted several different ways in which TAS makes

security patching more efficient:

- › Prior to investing in TAS, customers frequently had planned instances of downtime to deploy security patches to applications in their ecosystems. In an attempt to minimize the business impact of these downtime events, employees responsible for patching were often required to complete these patches on the weekends or work off-hours to complete them. The patches also relied on extensive manual work to run correctly. One interviewee described, “Some of those applications required numerous people on the phone while there were several other guys that were patching, moving traffic around, and doing all these things manually.”
- › By migrating applications to TAS, organizations alleviate the effort of many of their development and operations staff by automating these patches. The patching process no longer requires a full team to monitor and deploy the patches. Additionally, organizations no longer need planned instances of downtime as security updates occur behind the scenes. One customer highlighted the vast improvement that TAS provides the organization: “I don’t even know when the patch cycles happen now, whereas I knew exactly when they were scheduled, and I knew the impact before. It’s all done with zero involvement from the development groups. We have some security-related vulnerability scanning that runs, but security for the most part only has to run the scanners, and they have to react only when there’s a vulnerability found, which in many cases, it’s immediately remediated with the patch cycle, and it processes with no downtime or impact to customers.”

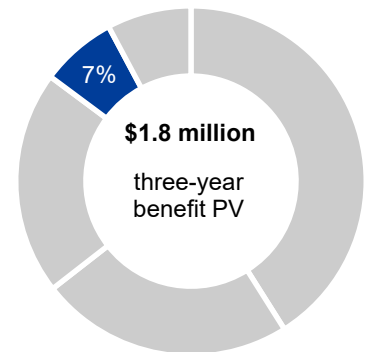
For the composite organization, Forrester assumes:

- › Prior to investing in TAS, the composite had a rotating team of eight FTEs comprised of operations and development employees to monitor and deploy patches. By migrating applications to TAS, the organization can repurpose some FTEs for more valuable work. In Year 1, the team size decreases to three FTEs, and by Year 3 of the analysis, the composite needs only one and a half FTEs to monitor these patches.
- › The average hourly fully loaded compensation of these employees is \$65.

The savings due to increased efficiency will vary with:

- › The speed at which applications are migrated to TAS platform.
- › The level of automation enabled by legacy solutions.
- › The size of internal teams required to execute security patches.

To account for these risks, Forrester adjusted this benefit downward by 5%, yielding a three-year risk-adjusted total PV of \$1,847,953.



Security patching efficiency: 7% of total benefits

Security Patching Efficiency: Calculation Table

Ref.	Metric	Calculation	Year 1	Year 2	Year 3
D1	FTEs involved in security patching, prior to TAS	Interviews	8	8	8
D2	FTEs involved in security patching, with TAS	Interviews	3.0	2.0	1.5
D3	Average annual fully loaded engineer compensation	Assumption	\$135,200	\$135,200	\$135,200
Dt	Security patching efficiency	(D1-D2)*D3	\$676,000	\$811,200	\$878,800
	Risk adjustment	↓5%			
Dtr	Security patching efficiency (risk-adjusted)		\$642,200	\$770,640	\$834,860

Hardware Cost Savings

Customers described the ways that TAS generates hardware cost savings:

- › As a result of migrating applications to TAS, organizations retire and consolidate their application development cycles by eliminating the need for many nonproduction phases and other associated environments. These organizations reduce the number of nonproduction environments and the virtual machines (VMs) associated with these environments.
- › One customer described these savings as follows: “We have several million dollars in cost avoidance using reclaimed hardware. Right now, we have 800 servers that we have for eCommerce, and we’ve been able to cannibalize a lot of that hardware for the nonproduction and production eCommerce environments.”

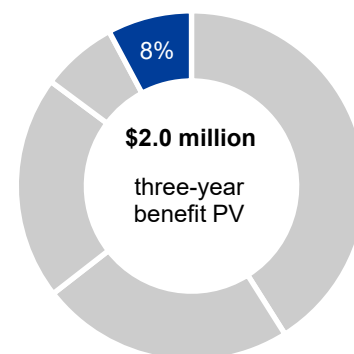
For the composite organization, Forrester assumes:

- › The composite organization consolidates a significant portion of the infrastructure formerly used to support its development pipeline. In Year 1, these savings are equal to \$750,000. As use and adoption of TAS grows, so do these hardware costs savings, increasing to \$1 million in Year 3.

Hardware cost savings may vary based on the following factors:

- › The percentage decrease in environments achieved by organizations.
- › The speed and level of adoption of TAS across organizations.

To account for these risks, Forrester adjusted this benefit downward by 5%, yielding a three-year risk-adjusted total PV of \$2,048,460.



**Hardware cost savings:
8% of total benefits**

Hardware Cost Savings: Calculation Table

Ref.	Metric	Calculation	Year 1	Year 2	Year 3
E1	Hardware cost savings	Interviews	\$750,000	\$875,000	\$1,000,000
Et	Hardware cost savings	E1	\$750,000	\$875,000	\$1,000,000
	Risk adjustment	↓5%			
Etr	Hardware cost savings (risk-adjusted)		\$712,500	\$831,250	\$950,000

Unquantified Benefits

In addition to the quantified benefits above, the interviewees experienced an additional benefit that was not able to be quantified:

- › **Improving developer experience reduces attrition.** Customers stated that TAS removes a significant portion of the tedious and frustrating tasks that developers were required to complete in their legacy environments. Additionally, the reduction in downtime enables developers to spend more time writing code, which increases their satisfaction. These factors contribute to lower attrition levels among developers. One interviewee noted: “Previously, I would say attrition was up to 15% to 20%. Now I would say it’s significantly less than that. We have some attrition, but it’s very little.”

Flexibility

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

- › **Expanding the use of TAS.** Interviewees stated that only a percentage of their applications are running on TAS. All customers noted that they are planning to migrate more applications to TAS. With more applications on TAS, customers may experience increased benefits or discover new benefits they have not realized.

Flexibility would 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.

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 costs	\$330,000	\$0	\$0	\$0	\$330,000	\$330,000
Gtr	TAS subscription and services costs	\$1,050,000	\$3,412,500	\$3,150,000	\$3,150,000	\$10,762,500	\$9,122,220
Htr	Management and training time	\$181,731	\$502,788	\$502,788	\$472,500	\$1,659,808	\$1,409,335
	Total costs (risk-adjusted)	\$1,561,731	\$3,915,288	\$3,652,788	\$3,622,500	\$12,752,308	\$10,861,555

Implementation Costs

Customers stated that implementing TAS was straightforward and required minimal effort to complete. One interviewee described the process as follows: “To get the platform up and running only took a couple of months, and then once those foundations were up and running, teams can work to build their own applications within the platform.”

For the composite organization, Forrester assumes:

- › A team of six employees comprised of operations staff and developers dedicate four months to implementing TAS across the organization.
- › The average monthly compensation of these employees is \$12,500.

The cost to implement TAS may vary based on:

- › The size of the team dedicated to managing the implementation of TAS.
- › The speed of adoption across the organization, which will affect the length of the implementation.

To account for these risks, Forrester adjusted this cost upward by 10%, yielding a three-year risk-adjusted total PV of \$330,000.

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 nearly \$10.9 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 Costs: Calculation Table

Ref.	Metric	Calculation	Initial	Year 1	Year 2	Year 3
F1	Months to implement TAS	Interviews	4			
F2	FTEs required to implement TAS	Interviews	6			
F3	Fully monthly burdened compensation	\$150,000/12	\$12,500			
Ft	Implementation costs	F1*F2*F3	\$300,000	\$0	\$0	\$0
	Risk adjustment	↑10%				
Ftr	Implementation costs (risk-adjusted)		\$330,000	\$0	\$0	\$0

Tanzu Application Service Subscription And Services Costs

Customers pay a flat annual subscription for use of TAS. This price will vary based on the number of application instances that customers have moved to TAS.

In addition to the annual subscription fee, most customers also use several services offered by VMware including Tanzu Labs Modern Application Development. During these engagements, experts from VMware teach staff best practices for continuous delivery and ultimately how to maximize the benefits from its investment in TAS. During engagements focused on modernizing existing applications, experts from VMware work with organizations to help plan, modernize, and migrate applications to TAS.

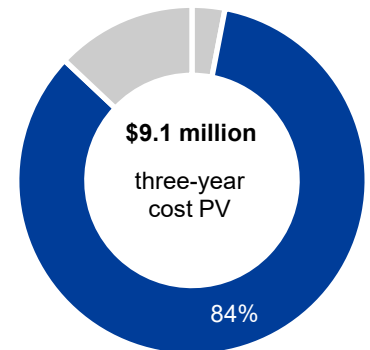
For the composite organization, Forrester assumes that:

- › The organization pays an average annual subscription cost of \$2.5 million per year over the three-year period.
- › The organization participates in several Tanzu Labs sessions during the first year of analysis. The cost of these services (inclusive of employee time) is \$1 million. Each subsequent year, the composite participates in additional Tanzu Labs sessions; however, it scales back the number of these sessions. By Year 3 the composite spends \$500,000 for these services.

The following risks could affect the cost of TAS subscription and services:

- › The total number of application instances that an organization migrates to TAS. Volume and other discounts can vary from organization to organization, which will affect the cost of Tanzu Application Service subscription.
- › The extent of use of Tanzu Labs services.

To account for these risks, Forrester adjusted this cost upward by 5%, yielding a three-year risk-adjusted total PV of \$9,122,220.



Tanzu Application Service subscription and services costs: 84% of total costs

Tanzu Application Service Subscription And Services Costs: Calculation Table

Ref.	Metric	Calculation	Initial	Year 1	Year 2	Year 3
G1	TAS license cost	Assumption	\$0	\$2,500,000	\$2,500,000	\$2,500,000
G2	TAS services costs	Assumption	\$1,000,000	\$750,000	\$500,000	\$500,000
Gt	Tanzu Application Service subscription and services costs	G1+G2	\$1,000,000	\$3,250,000	\$3,000,000	\$3,000,000
	Risk adjustment	↑5%				
Gtr	Tanzu Application Service subscription and services costs (risk-adjusted)		\$1,050,000	\$3,412,500	\$3,150,000	\$3,150,000

Management And Training Time

For the composite organization, Forrester assumes:

- › The composite organization has three resources internally who are dedicated to the management and oversight of TAS.

- › All developers spend 8 hours training on how to best use TAS and how to integrate the best practices taught by Tanzu Labs into their daily workflows. As more developers are onboarded to the platform each year, they all complete these training sessions.
- › The average fully loaded compensation for employees managing and training to use TAS is \$150,000.

The following factors will affect training and management costs:

- › The speed of organizational adoption, which will affect how many developers are onboarded to TAS annually.
- › The use of VMware professional services, as this may reduce or eliminate the need for additional training.

To account for these risks, Forrester adjusted this cost upward by 5%, yielding a three-year risk-adjusted total PV of \$1,409,335.

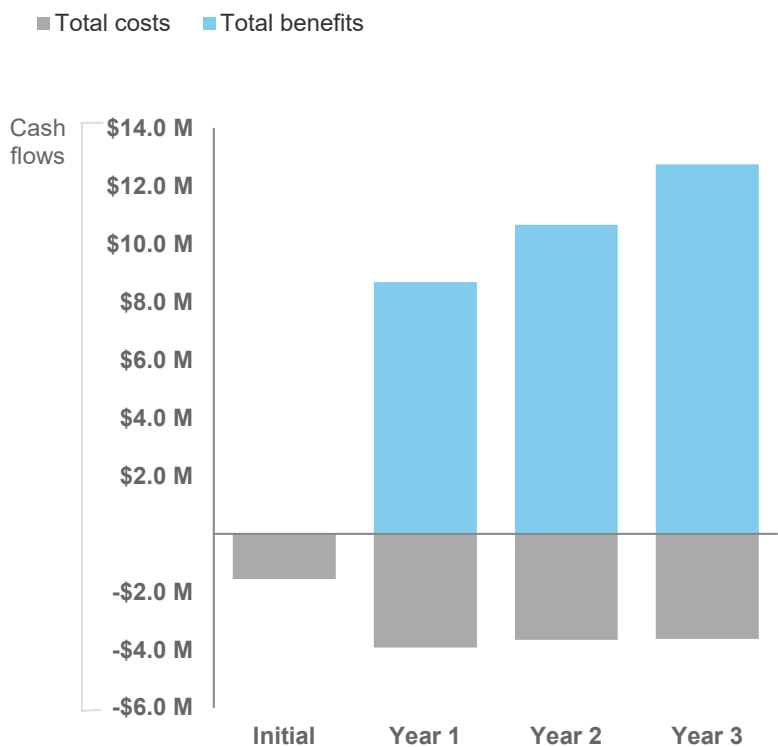
Management And Training Time: Calculation Table

Ref.	Metric	Calculation	Initial	Year 1	Year 2	Year 3
H1	TAS management FTEs	Interviews		3	3	3
H2	Number of developers requiring training	Interviews	300	50	50	
H3	Hours of training per developer	Assumption	8	8	8	
H4	Average annual fully loaded compensation	Assumption	\$150,000	\$150,000	\$150,000	\$150,000
Ht	Management and training time	$(H1*H4)+(H2*H3*(H4/2,080))$	\$173,077	\$478,846	\$478,846	\$450,000
	Risk adjustment	↑5%				
Htr	Management and training time (risk-adjusted)		\$181,731	\$502,788	\$502,788	\$472,500

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 and NPV for the composite organization's investment. Forrester assumes a yearly discount rate of 10% for this analysis.



These risk-adjusted ROI and NPV 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	(\$1,561,731)	(\$3,915,288)	(\$3,652,788)	(\$3,622,500)	(\$12,752,308)	(\$10,861,555)
Total benefits	\$0	\$8,688,944	\$10,658,686	\$12,742,048	\$32,089,678	\$26,281,160
Net benefits	(\$1,561,731)	\$4,773,656	\$7,005,898	\$9,119,548	\$19,337,370	\$15,419,605
ROI						142%

VMware Tanzu Application Service: Overview

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

Continuously deliver any app to every major private and public cloud with a single platform.

Become A Software-Driven Enterprise

You are moving faster toward a software-driven future. To differentiate your business, your teams are writing more software than ever. But tolerance for downtime is plummeting, and security has never been more important. Under this backdrop, how do you stay competitive and grow your digital business? The answer is Tanzu Application Service.

Why Your Peers Choose Tanzu Application Service

Tanzu Application Service is the proven solution for companies seeking software-led, digital transformation. Here is why:

Developer Productivity

Accelerate feature delivery. Use Tanzu Application Service's portfolio of modern runtimes to deliver features faster.

Comprehensive Security

Reduce risk in your app portfolio. Protect systems from attackers using the three Rs of security: repair, repave, and rotate.

Operative Efficiency

Enjoy a 200:1 developer-to-operator ratio. Designed for zero-downtime deployments. Run on every major private and public cloud.

High Availability

Deliver enterprise SLAs at scale. Rely on built-in high availability to keep customer-facing systems online under even the most challenging circumstances.

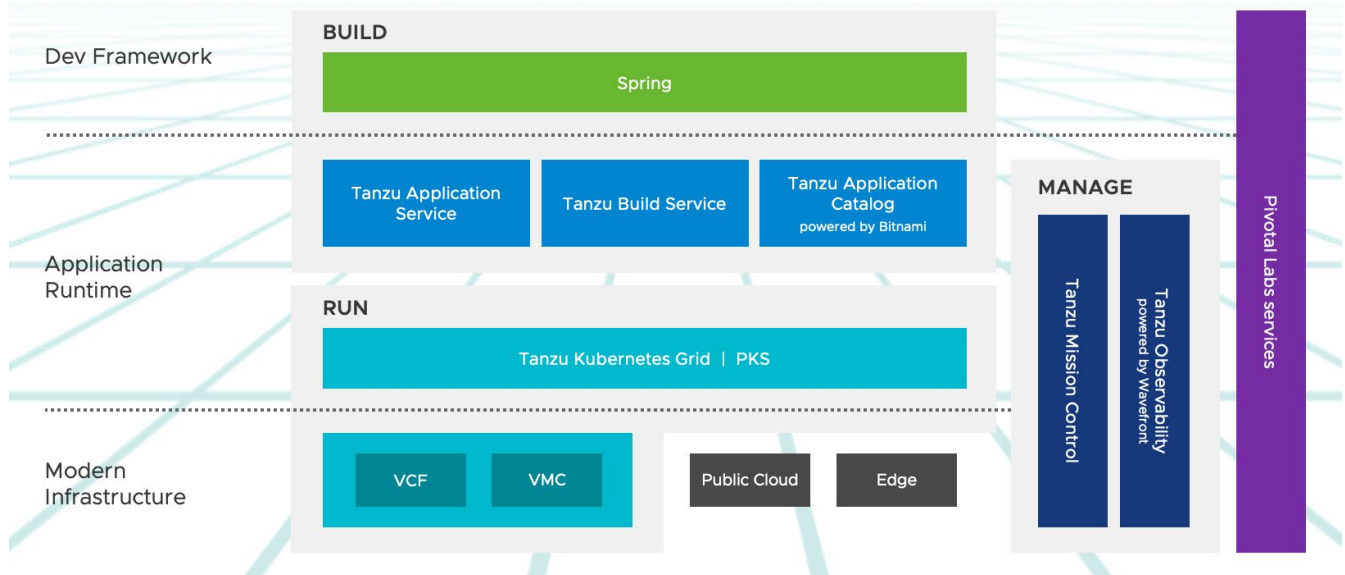
At A Glance

- With an operational model that provides a clean separation of developer and operator functions, Tanzu Application Service provides a turnkey platform-as-a-service (PaaS) experience for development teams to rapidly update and scale applications that can be instantly expanded and upgraded with no downtime.
- Enterprise-grade capabilities so operations teams get control and visibility into applications running on their choice of cloud while offering developers flexibility and speed to build their applications with the best-fit framework.
- Automatic service provisioning and application binding that provides apps instant access to a variety of popular services to build new applications, testing, and hands-on experience.

VMware Tanzu Portfolio: Full-Stack Software Modernization

Tanzu Application Service is part of the broader VMware Tanzu portfolio of products and services for modernizing your applications and infrastructure. The portfolio simplifies multi-cloud operations, while freeing developers to move faster and access the right resources for building the best applications. VMware Tanzu enables development and operations' teams to work together in new ways that deliver transformative business results.

Portfolio Detail



Tanzu Portfolio Value

SHIP GREAT SOFTWARE FASTER

Increase velocity with a modern software supply chain. Use your favorite DevOps tools and frameworks like Spring to build and deploy microservices. Extend your apps with verified open-source tech. See the real impact of code in production with full-stack observability.

SIMPLIFY MULTI-CLOUD OPERATIONS

Get your infrastructure ready for modern apps with consistent, conformant Kubernetes everywhere. Centrally manage, secure, and govern your clusters no matter where they reside. Observe, analyze, and operate Kubernetes-based infrastructure and the services running on it to gain efficiencies and optimize costs.

TRANSFORM DEV AND OPS TOGETHER

Unite application developers and operations teams around the shared goals of fast release cycles and superior application availability. Save time and effort modernizing apps. Get hands on with cloud-native practices. Run a modern applications platform.

For more information, go to: cloud.vmware.com/tanzu

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 Source: “Digital Transformation Requires Development Transformation,” Forrester Research, Inc., December 13, 2019.

² Ibid.