The Total Economic Impact™ Of Red Hat OpenShift Platform Plus
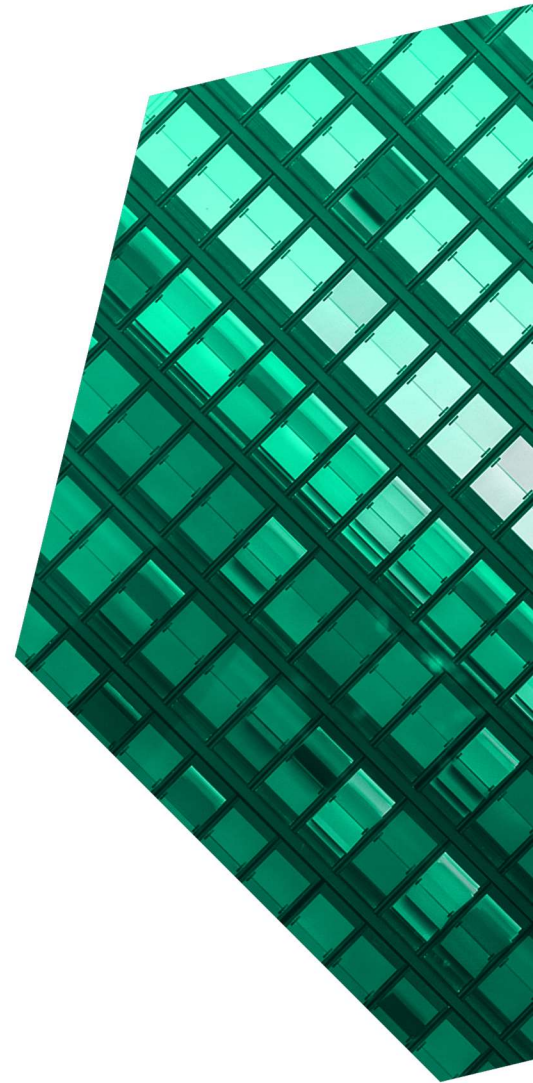
Cost Savings And Business Benefits
Enabled By OpenShift Platform Plus

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Executive Summary

Software containers, specifically the Kubernetes open source container orchestration platform, have made application development and deployment easier and faster by packaging together the application's software code with all its necessary components in a lightweight package. Red Hat's OpenShift Platform Plus provides this capability and improves productivity, reduces downtime, reduces hiring difficulty, enhances security, and improves the speed and frequency of software releases and updates.

Modern application development is increasingly focused on containers, which can be deployed faster and run more efficiently than virtual machines. The cloud enables container deployment at scale, so container strategies have traditionally had strong ties to corporate cloud strategies. As organizations modernize their cloud strategies, containers and other cloud-native technologies are at the center of discussion.[1]

Red Hat OpenShift Platform Plus is an enterprise hybrid cloud application platform built on open source Kubernetes and other upstream projects that enables organizations to build, deploy, and run applications at massive scale. Organizations can distribute containerized applications across on-premises, cloud, and edge environments using OpenShift Platform Plus. Red Hat offers management, security, and storage capabilities with OpenShift Platform Plus; which includes the core OpenShift Container Platform and adds Red Hat Advanced Cluster Management for Kubernetes, Red Hat Advanced Cluster Security for Kubernetes, the Red Hat Quay global registry for container images, and Red Hat OpenShift Data Foundation Essentials to provide storage services.

Red Hat commissioned Forrester Consulting to conduct a Total Economic Impact™ (TEI) study and examine the potential return on investment (ROI) organizations may realize by deploying OpenShift Platform Plus. This study provides readers with a framework to evaluate the potential financial impact of OpenShift Platform Plus on their organizations.

KEY STATISTICS

Return on investment (ROI)
203%

Net present value (NPV)
$4.63M

To better understand the benefits, costs, and risks associated with this investment, Forrester interviewed four representatives with experience using OpenShift Platform Plus. Forrester aggregated the interviewees' experiences into a single composite organization that is a global organization with 10,000 employees and revenue of $5 billion per year.

Prior to OpenShift Platform Plus, the interviewees' organizations had been using virtual machines, and some were starting to use the OpenShift Container Platform. Interviewees' organizations wanted to focus on cloud-native development, but they faced the following challenges: an infrastructure that was poorly suited for cloud-native application development; application outages and downtime; difficulty scaling applications quickly; and excessive timeframes for application releases and upgrades.

To address these challenges, it is possible to work directly with open source code available through the Cloud Native Computing Foundation (CNCF) to build

your own Kubernetes solution; however, only a few organizations have the size and resources to do this. Most organizations need help to ensure that they spend time using Kubernetes, rather than building and maintaining the platform itself.[2]

By deploying OpenShift Platform Plus, the interviewees' organizations overcame these challenges and were able to improve software developer productivity, reduce application downtime, and avoid hiring additional DevOps engineers with Kubernetes experience. In addition, OpenShift Platform Plus enhances security posture, improves the speed and frequency of software releases and updates, enables upskilling and a better employee experience for software developers, and reduces IT infrastructure costs for some deployments.

KEY FINDINGS

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

- **Software developer productivity improved by 10%.** OpenShift Platform Plus automated workflows, streamlined collaboration, enabled rapid and easy application scaling, and helped teams conduct code quality checks. Security integration with DevOps workflows (DevSecOps) further enabled rapid vulnerability scanning, monitoring, and debugging. OpenShift Platform Plus enables the composite organization to recapture $7,746 per software developer per year in additional productivity, driving $3.1 million in benefits over three years.

- **Application downtime reduced by 24 hours per end user per year.** OpenShift Platform Plus reduced downtime and improved end user productivity by both redistributing workloads, especially if there is a failure (instead of taking down servers), and enabling rolling updates with minimal downtime. OpenShift Platform Plus enables the composite organization to save $387 per end user per year in lost productivity due to

application downtime, resulting in $2.3 million in benefits over three years.

- **DevOps engineer hiring reduced by five engineers.** OpenShift Platform Plus provided components, management, and support that organizations would otherwise need to develop or integrate themselves when building an application platform for modern containerized software. As tech leaders face a talent crunch, it takes longer and costs more to attract the talent they need.[3] Seventy-one percent of open source professionals and 68% of hiring managers indicated that cloud and containers are the open source skills with the highest demand.[4] The composite organization avoids hiring five high-demand DevOps engineers with Kubernetes experience, avoiding $1.5 million over three years.

Unquantified benefits. The composite organization also experiences the following qualitative benefits:

- **Enhanced security posture.** Red Hat's Advanced Cluster Security for Kubernetes enables faster and better identification, analysis, and resolution of security vulnerabilities.

- **Improved speed and frequency of software releases and updates.** With OpenShift Platform Plus, software releases and updates can now be done more frequently. This provides a better customer or employee experience, depending on the type of application.

- **Upskilling DevOps engineers and software developers.** DevOps engineers want to learn how to deploy and manage a container platform that will enable their organizations' software developers to improve their productivity by spending more time on application development and less time on IT infrastructure activities related to application development. Software developers have embraced containers as a means to avoid productivity-stopping

dependencies and to build and ship code faster through a continuous integration/continuous deployment (CI/CD) pipeline.[5] By improving software developer productivity, OpenShift Platform Plus provides a better employee experience (EX) for them.

- **Reduced IT infrastructure costs.** For some deployments, existing infrastructure can be better utilized, creating savings due to avoided additional infrastructure.

- **Operations and administration cost savings.** The composite organization shifts IT operations away from legacy IT infrastructure to maintain, configure, and manage OpenShift Platform Plus.

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

- **Subscription.** OpenShift Platform Plus subscription costs depend on organizations' unique deployment characteristics, especially the number of nodes dedicated to running containerized workloads and the capacity of those nodes.

- **Implementation.** The composite organization's engineers and developers deploy OpenShift Platform Plus in eight months. Infrastructure for the development and production environment infrastructure is also needed.

- **Developer training.** Developers require training to understand how to develop and deploy applications using OpenShift Platform Plus.

Synopsis. The representative interviews and financial analysis found that a composite organization experiences benefits of $6.92 million over three years versus costs of $2.29 million, adding up to a net present value (NPV) of $4.63 million and an ROI of 203%.

> **"OpenShift Platform Plus is doing all the things we want to do. It's overall cheaper than buying each product separately. It's a much better value proposition than picking one solution from each vendor."**
>
> *Head of cloud, financial services*

ROI
203%

BENEFITS PV
$6.92M

NPV
$4.63M

PAYBACK
12 months

Benefits (Three-Year)

Improved software developer productivity	$3.1M
Reduced application downtime	$2.3M
Avoided DevOps hiring	$1.5M
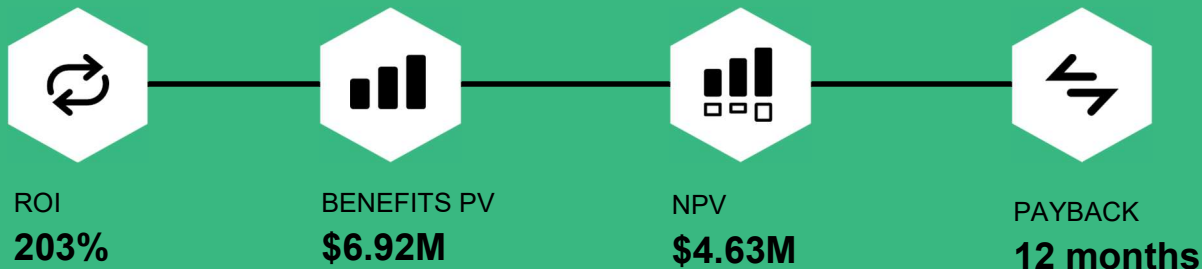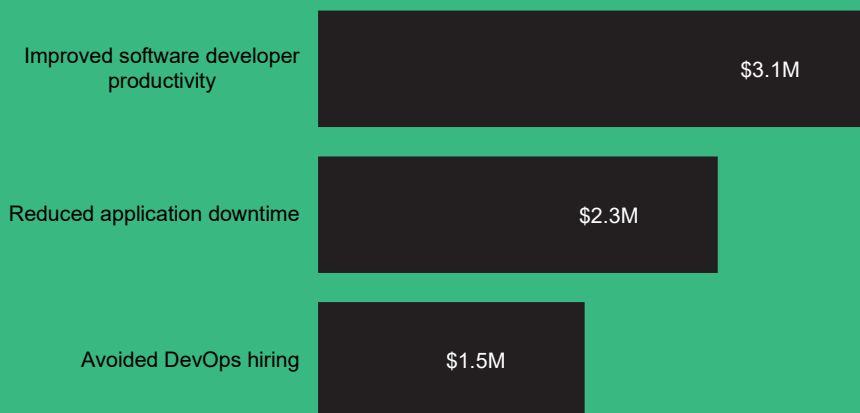
"Red Hat OpenShift Platform Plus provides a one-stop shop container platform with add-ons at an effective cost. It's an important part of an IT modernization strategy to move from monolithic applications to microservices."

— *Service owner, IT professional services*

TEI FRAMEWORK AND METHODOLOGY

From the information provided in the interviews, Forrester constructed a Total Economic Impact™ framework for those organizations considering an investment in OpenShift Platform Plus.

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 OpenShift Platform Plus can have on an organization.

DISCLOSURES

Readers should be aware of the following:

This study is commissioned by Red Hat 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 study to determine the appropriateness of an investment in OpenShift Platform Plus.

Red Hat 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.

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

DUE DILIGENCE
Interviewed Red Hat stakeholders and Forrester analysts to gather data relative to OpenShift Platform Plus.

INTERVIEWS
Interviewed four representatives at organizations using OpenShift Platform Plus to obtain data with respect to costs, benefits, and risks.

COMPOSITE ORGANIZATION
Designed a composite organization based on characteristics of the interviewees' 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 interviewees.

CASE STUDY
Employed four fundamental elements of TEI in modeling the investment impact: benefits, costs, flexibility, and risks. Given the increasing sophistication of ROI analyses related to IT investments, Forrester's TEI methodology provides a complete picture of the total economic impact of purchase decisions. Please see Appendix A for additional information on the TEI methodology.

The Red Hat OpenShift Platform Plus Customer Journey

Interviews				
Role	**Industry**	**Region**	**Revenues**	**Number Of Employees**
DevOps manager	Aerospace	HQ in US, operational worldwide	$36 billion	90,000
Technical lead (container platform)	Healthcare	HQ and operational in EMEA	$9 billion	20,000
Head of cloud and platform DevOps services	Financial services	HQ in Europe, operational worldwide (business unit of a global financial services conglomerate)	$500 million	900
Service owner (containers)	IT professional services	HQ and operational in Scandinavia	$300 million	700

KEY CHALLENGES

Prior to OpenShift Platform Plus, the interviewees' organizations were using virtual machines, and some were starting to use the OpenShift Container Platform.

As the interviewees' organizations wanted to develop and deploy more cloud-native applications, this approach presented challenges, including:

- **Application development environment was not well suited for cloud-native apps and microservices.** The interviewees identified several issues related to this challenge, especially software developers having to devote too much time to infrastructure-related aspects of application development. Other issues included difficulty scaling applications quickly as well as outages and downtime for applications.

- **Lengthy timeframes for application releases and upgrades.** The existing application development environment did not support a rapid development of apps. This meant that business needs for speed of growth and the transition to digital were not met.

- **Lack of necessary skills and expertise.** Interviewees lacked the necessary in-house skills and expertise with cloud-native application development platforms, and the number of

developers and engineers in the marketplace with these skills and expertise is limited.

VENDOR REQUIREMENTS

The interviewees' organizations searched for a solution that could:

- Provide expertise and deep capabilities in open source and containerization.

- Bundle container and cluster management capabilities, including integration of security.

- Provide enterprise-grade support.

- Enable IT modernization at an enterprise scale, including cloud-native apps and microservices, agile software development processes, and future proofing; especially for a hybrid-cloud environment.

DEPLOYMENT

All the interviewees' organizations chose a phased deployment for OpenShift Platform Plus. Phasing could be based on certain types of applications, i.e., employee- or customer-facing, or by division or geography.

Considering that OpenShift Platform Plus was launched in mid-2021, the interviewees' organizations have adopted a phased approach for which components of OpenShift Platform Plus they

use. All of those interviewed use the core OpenShift Container Platform, which includes Advanced Cluster Management for Kubernetes and Advanced Cluster Security for Kubernetes being the key OpenShift Platform Plus components typically used to date.

Interviewees' organizations expect to rapidly and significantly increase their usage of the OpenShift Platform Plus components they currently have deployed and to begin to deploy other components.

COMPOSITE ORGANIZATION

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

Description of composite. A global organization with $5 billion in annual revenue and 10,000 employees.

Deployment characteristics. By the end of Year 1, 100 software developers are using OpenShift Platform Plus. Key OpenShift Platform Plus deployment characteristics for Year 1 include: five OpenShift clusters and 30 nodes in total.

Key Assumptions
- **Global organization with $5 billion in annual revenue**
- **10,000 employees**
- **Five OpenShift clusters**

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	Improved software developer productivity	$464,737	$1,161,841	$2,323,682	$3,950,260	$3,128,504
Btr	Reduced application downtime	$193,800	$775,200	$1,938,000	$2,907,000	$2,272,891
Ctr	Avoided DevOps hiring	$464,738	$619,650	$774,563	$1,858,950	$1,516,536
	Total benefits (risk-adjusted)	$1,123,274	$2,556,691	$5,036,245	$8,716,210	$6,917,931

Details on each of the above benefits can be found on the pages that follow

IMPROVED SOFTWARE DEVELOPER PRODUCTIVITY

Evidence and data. With OpenShift Platform Plus, software developers saved 10% of their time through:

- Automated workflows and streamlined collaboration. The DevOps manager from the aerospace industry pointed to a few of the OpenShift Platform Plus features (e.g., roles, permissions, web console, operators, single sign-on, and monitoring tools) that enable automation and collaboration for software developers.

- Rapid and easy application scaling. The technical lead for a healthcare organization said: "Now, when we have an application on OpenShift Platform Plus, we have the ability to scale in a very short time. Versus in the old way, when we had a virtual service behind the load balancer."

- Security integration with DevOps workflows (DevSecOps). The technical lead for a healthcare organization pointed out, "With OpenShift Platform Plus, it is much faster working with our CISO team than in other environments since we have already configured all the compliance, all the benchmarks, and all the security rules."

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

- OpenShift Platform Plus provides software container capabilities for 60 developers over the course of Year 1; this grows to 300 by Year 3.

- Each software developer saves 10% of their time (208 hours per year).

- A 50% productivity recapture rate reflects that not all the time savings will be reallocated as improved software developer productivity from OpenShift Platform Plus.

- Average hourly compensation per software developer (fully burdened) is $88.

Risks. The benefit of improved developer productivity could vary, and specific considerations include:

- Number of software developers supported.

- Ability to realize a similar level of productivity improvement, which reflects the prior IT infrastructure and development environment.

- The geographic region, which impacts the average software developer salary.

Results. To account for these risks, Forrester adjusted this benefit downward by 15%, yielding a three-year, risk-adjusted total PV (discounted at 10%) of $3.1 million. Annually, this equates to a risk-adjusted benefit of $7,746 per software developer.

Improved Software Developer Productivity					
Ref.	Metric	Source	Year 1	Year 2	Year 3
A1	Number of software developers utilizing OpenShift Platform Plus	Composite	60	150	300
A2	Hours saved per software developer	Interviews	208	208	208
A3	Productivity recapture rate	TEI standard	50%	50%	50%
A4	Average hourly compensation per software developer (fully burdened)	TEI standard	$87.62	$87.62	$87.62
At	Improved software developer productivity	A1*A2*A3*A4	$546,749	$1,366,872	$2,733,744
	Risk adjustment	↓15%			
Atr	Improved software developer productivity (risk-adjusted)		$464,737	$1,161,841	$2,323,682
	Three-year total: $3,950,260		**Three-year present value: $3,128,504**		

REDUCED APPLICATION DOWNTIME

Evidence and data. Applications running on OpenShift Platform Plus enabled end users to save 24 hours per year in downtime by:

- Redistributing workloads, especially if there is a failure (instead of taking down servers). The DevOps manager from the aerospace industry noted: "Reliability was an important part of why we moved to OpenShift Platform Plus. It allows us to decouple applications so that the projects are on their own. This has reduced downtime for our applications."

- Enabling rolling updates with minimal downtime by conducting readiness checks and replacing previous application versions with new application versions.

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

- End users experience 24 hours a year in reduced downtime for the online applications they use.

- There are 500 end users that benefit in Year 1; this grows to 5,000 by Year 3.

- A 50% productivity recapture rate reflects that not all the time savings will be reallocated as improved end user productivity from the applications running on OpenShift Platform Plus.

- Average hourly compensation per end user (fully burdened) is $38.

Risks. The benefit of reduced application downtime could vary, and specific considerations include:

- The number of applications developed and managed with OpenShift Platform Plus.

- The complexity of those applications.

- The geographic region, which impacts the average end user salary.

Results. To account for these risks, Forrester adjusted this benefit downward by 15%, yielding a three-year, risk-adjusted total PV of $2.3 million. Annually, this equates to a risk-adjusted benefit of $387 per end user.

Reduced Application Downtime					
Ref.	**Metric**	**Source**	**Year 1**	**Year 2**	**Year 3**
B1	Hours of end user-impacting downtime prevented per year with OpenShift Platform Plus	Interviews	24	24	24
B2	Average number of end users using applications running on OpenShift Platform Plus during downtime	Composite and interviews	500	2,000	5,000
B3	Productivity recapture rate	TEI standard	50%	50%	50%
B4	Average fully burdened hourly salary for private industry FTEs	TEI standard	$38	$38	$38
Bt	Reduced application downtime	B1*B2*B3*B4	$228,000	$912,000	$2,280,000
	Risk adjustment	↓15%			
Btr	Reduced application downtime (risk-adjusted)		$193,800	$775,200	$1,938,000
	Three-year total: $2,907,000		**Three-year present value: $2,272,891**		

AVOIDED DEVOPS HIRING

Evidence and data. The interviewees' organizations were able to avoid having to hire DevOps engineers with Kubernetes experience by using OpenShift Platform Plus instead of adopting a DIY approach. OpenShift Platform Plus provided the components, management, and support that an organization would otherwise have needed to develop or integrate into a DIY container platform.

The DevOps manager from the aerospace industry shared: "If we had gone with general open source for Kubernetes, we would had to have at least doubled our team. It would have been more expensive." They continued: "Hiring people with Kubernetes experience is extremely difficult. Those people are very rare and very expensive. OpenShift Platform Plus allows us to call a phone number when things break, which means we don't have to have the expertise in-house to rebuild the code."

Also, it would have been difficult to recruit DevOps engineers with Kubernetes experience because the number of engineers in the marketplace with these skills and expertise is limited.

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

- The composite organization does not have to hire three DevOps engineers with Kubernetes experience in Year 1; this number increases to five engineers in total by Year 3.

- Average annual salary for each DevOps engineer with Kubernetes experience (fully burdened) is $182,250.

Risks. The benefit of avoided DevOps hiring could vary, and specific considerations include:

- The size of the engineering team dedicated to IT infrastructure.

- The container and cluster skills and knowledge of the IT infrastructure engineers.

- The geographic region, which impacts the average DevOps engineer salary.

Results. To account for these risks, Forrester adjusted this benefit downward by 15%, yielding a three-year, risk-adjusted total PV of $1.5 million.

Avoided DevOps Hiring					
Ref.	**Metric**	**Source**	**Year 1**	**Year 2**	**Year 3**
C1	Number of DevOps avoided by using OpenShift Platform Plus	Interviews	3	4	5
C2	Average annual fully burdened salary for DevOps	TEI standard	$182,250	$182,250	$182,250
Ct	Avoided DevOps hiring	C1*C2	$546,750	$729,000	$911,250
	Risk adjustment	↓15%			
Ctr	Avoided DevOps hiring (risk-adjusted)		$464,738	$619,650	$774,563
	Three-year total: $1,858,950		**Three-year present value: $1,516,536**		

UNQUANTIFIED BENEFITS

Additional benefits that customers experienced but were not able to quantify include:

- **Enhanced security posture.** Red Hat's Advanced Cluster Security for Kubernetes enables faster and better identification, analysis, and resolution of security vulnerabilities.

    - An aerospace DevOps manager pointed out, "We are able to automatically stop vulnerable applications from being deployed in the first place because now most of our vulnerability management is around what's in production."

    - Another capability was identified by a healthcare tech lead, "The security improvement is amazing because we now have complete visibility of what we're running in the network."

    - The container service owner for an IT professional services firm noted faster identification and response to security issues, "We can just look into the Advanced Cluster Security console and see if anything is affected because the security scanner is scanning continuously."

- **Improved speed and frequency of software releases and updates.** Customers pointed to the improved stability of OpenShift Platform Plus versus previous approaches to application development and deployment; they also noted faster internal security approvals as reasons for this benefit. Improved speed and frequency of software releases and updates provide a better customer or employee experience, depending on the type of application.

- **Upskilling DevOps engineers and software developers.** DevOps engineers want to learn how to deploy and manage a container platform that will enable their organizations' software

developers to improve their productivity by spending more time on application development and less time on IT infrastructure activities related to application development. A healthcare technical lead noted, "Our developers all want to work on OpenShift Platform Plus — they don't have to do the manual IT things like they did before when they're developing apps." By improving developer productivity, OpenShift Platform Plus provides a better EX for developers.

- **Reduced IT infrastructure costs.** For some deployments, existing infrastructure can be better utilized, creating savings due to avoided additional infrastructure.

- **Operations and administration cost savings.** The composite organization shifts IT operations away from legacy infrastructure to maintain, configure, and manage OpenShift Platform Plus.

FLEXIBILITY

The value of flexibility is unique to each customer. There are multiple scenarios in which a customer might implement OpenShift Platform Plus and later realize additional uses and business opportunities, including the ability to:

- **Adopt more capabilities in the OpenShift Platform Plus integrated suite.** Interviewees are in the process of launching more of the integrated components in the OpenShift Platform Plus suite to drive additional benefits, especially security.

- **Move more applications and workloads to the cloud and scale quickly.** Interviewees expect their organizations to leverage OpenShift Platform Plus as a key part of their IT infrastructure to move applications to the cloud and enable scaling quickly as needed due to future demand from end users.

- **Modernize and future proof IT infrastructure for cloud-native applications and**

microservices. Interviewees view OpenShift Platform Plus as a key tool in modernizing and future-proofing IT infrastructure for the cloud. The head of cloud for a financial services organization noted: "OpenShift Platform Plus has what you need as you grow: centralized registry, security, a centralized manager if you have a lot of clusters, and good reliable storage. As you start to have more applications running on OpenShift and you get more mature in this space, you start needing the extra products that are in Platform Plus."

This study's interviewees also pointed to the flexibility that OpenShift Platform Plus provides in moving to a hybrid cloud environment.

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
Dtr	Subscription	$0	$223,125	$446,250	$669,375	$1,338,750	$1,074,554
Etr	Implementation	$455,963	$0	$0	$0	$455,963	$455,963
Ftr	Developer training	$80,610	$322,442	$241,831	$241,831	$886,714	$755,291
	Total costs (risk-adjusted)	$536,574	$545,567	$688,081	$911,206	$2,681,428	$2,285,808

SUBSCRIPTION

Evidence and data. This cost category is for the annual subscription for a self-managed OpenShift Platform Plus deployment with premium support. OpenShift Platform Plus includes OpenShift Container Platform as well as Advanced Cluster Management for Kubernetes, Advanced Cluster Security for Kubernetes, Quay, and OpenShift Data Foundation Essentials. Key drivers of cost are the number of nodes dedicated to running containerized workloads and the capacity of those nodes.

Modeling and assumptions. In modeling subscription costs for the composite organization, Forrester assumes:

- There are five OpenShift clusters deployed in Year 1, with six nodes per cluster that run container workloads

Risks. The key risk that impacts the subscription cost is the deployment and scale of the OpenShift Platform Plus environment.

Results. To account for these risks, Forrester adjusted this cost upward by 5%, yielding a three-year, risk-adjusted total PV (discounted at 5%) of $1.1 million.

Subscription

Ref.	Metric	Source	Initial	Year 1	Year 2	Year 3
D1	Subscription	Composite		$212,500	$425,000	$637,500
Dt	Subscription	D1	$0	$212,500	$425,000	$637,500
	Risk adjustment	↑5%				
Dtr	Subscription (risk-adjusted)		$0	$223,125	$446,250	$669,375
	Three-year total: $1,338,750			Three-year present value: $1,074,554		

IMPLEMENTATION

Evidence and data. To implement OpenShift Platform Plus, the interviewees' organizations made infrastructure investments and dedicated several engineering and developer resources to install and configure OpenShift Platform Plus. The initial implementations took approximately eight months to complete.

Modeling and assumptions. In modeling implementation costs for the composite organization, Forrester assumes:

- The composite organization invests in an additional $50,000 of development and production environment infrastructure.[6]

- The composite organization dedicates three engineering and developer FTEs to the implementation process with an average monthly wage rate of $15,188.[7]

- The implementation requires eight months.

Risks. Organizations may experience differing OpenShift Platform Plus implementation costs based on:

- Prevailing wage rates.

- Availability and skill sets of internal resources.

- The size and complexity of deployment.

Results. To account for these risks, Forrester adjusted this cost upward by 10%, yielding a three-year, risk-adjusted total PV of $500,000.

Implementation						
Ref.	**Metric**	**Source**	**Initial**	**Year 1**	**Year 2**	**Year 3**
E1	Investment in additional development and production environment infrastructure	TEI of Red Hat OpenShift Services and Support	$50,000			
E2	Number of engineers and developers involved in implementation	TEI of Red Hat OpenShift Services and Support	3			
E3	Implementation duration (months)	Interviews	8			
E4	Engineer/developer monthly rate (fully burdened)	TEI of Red Hat OpenShift Services and Support	$15,188			
Et	Implementation	E1+(E2*E3*E4)	$414,512	$0	$0	$0
	Risk adjustment	↑10%				
Etr	Implementation (risk-adjusted)		$455,963	$0	$0	$0
	Three-year total: $455,963			**Three-year present value: $455,963**		

DEVELOPER TRAINING

Evidence and data. In addition to the training provided by Red Hat, interviewees' organizations felt that it was necessary for their software developers to spend several days, typically on their own and in teams, to learn how to use OpenShift Platform Plus. And while this amount of time was longer than initially expected, customers viewed it as well worth the investment for both the organization and the software developers. This training provides an opportunity to learn an emerging system for IT infrastructure management and scaling, as well as application development and deployment.

Modeling and assumptions. To model the cost for the composite organization, Forrester assumes:

- Each year, 100 software developers will require training, with 20 developers trained initially.

- The training for the initial set of software developers will require 40 hours (and 24 hours for training developers after an initial group of developers learn OpenShift Platform Plus, initially and in Year 1).

- Average hourly compensation per software developer (fully burdened) is $88.

Risks. Organizations may experience variable training costs based on:

- The number of software developers participating in the training as well as the scale of the OpenShift Platform Plus deployment.

- Prevailing labor rates.

Results. To account for these risks, Forrester adjusted this cost upward by 15%, yielding a three-year, risk-adjusted total PV of $800,000.

Developer Training						
Ref.	**Metric**	**Source**	**Initial**	**Year 1**	**Year 2**	**Year 3**
F1	Software developers trained on OpenShift Platform Plus	Composite	20	80	100	100
F2	Hours of training	Interviews	40	40	24	24
F3	Average hourly compensation per software developer (fully burdened)	A4	$87.62	$87.62	$87.62	$87.62
Ft	Developer training	F1*F2*F3	$70,096	$280,384	$210,288	$210,288
	Risk adjustment	↑15%				
Ftr	Developer training (risk-adjusted)		$80,610	$322,442	$241,831	$241,831
	Three-year total: $886,714			**Three-year present value: $755,291**		

Financial Summary

CONSOLIDATED THREE-YEAR RISK-ADJUSTED METRICS

Cash Flow Chart (Risk-Adjusted)
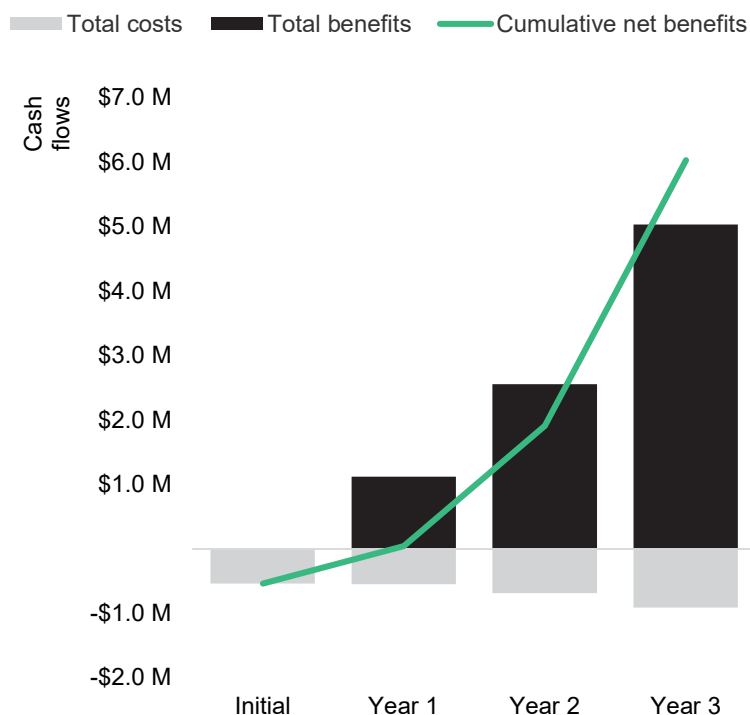
The financial results calculated in the Benefits and Costs sections can be used to determine the ROI, NPV, and payback period for the composite organization's investment. Forrester assumes a yearly discount rate of 10% for this analysis.

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	($536,574)	($545,567)	($688,081)	($911,206)	($2,681,428)	($2,285,808)
Total benefits	$0	$1,123,274	$2,556,691	$5,036,245	$8,716,210	$6,917,931
Net benefits	($536,574)	$577,708	$1,868,610	$4,125,039	$6,034,783	$4,632,123
ROI						203%
Payback period						12.0 months

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: Supplemental Material

Related Forrester Research

"Best Practices: Kubernetes," Forrester Research, Inc., February 2, 2022.

"Top 10 Facts Every Cloud Leader Needs To Know About Kubernetes And Containers," Forrester Research, Inc., October 25, 2021.

"The Total Economic Impact™ Of Red Hat OpenShift Cloud Services," a commissioned study conducted by Forrester Consulting on behalf of Red Hat, December 2021.

"The Total Economic Impact™ Of Red Hat Services and Support for OpenShift," a commissioned study conducted by Forrester Consulting on behalf of Red Hat, March 2022.

Appendix C: Endnotes

[1] Source: "Executive Guide 2022: Cloud," Forrester Research, Inc., February 21, 2022.

[2] Source: "Best Practices: Kubernetes," Forrester Research, Inc., February 2, 2022.

[3] Source: "A Skills-Based Talent Strategy Is Central To An Adaptive Organization," Forrester Research, Inc., September 26, 2022.

[4] Source: Linux Foundation Research Team, "The 10th Annual Open Source Jobs Report," The Linux Foundation, June 2022.

[5] Source: "Best Practices: Kubernetes," Forrester Research, Inc., February 2, 2022.

[6] Source: "The Total Economic Impact™ Of Red Hat Services and Support for OpenShift," a commissioned study conducted by Forrester Consulting on behalf of Red Hat, March 2022.

[7] Source: Ibid.

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