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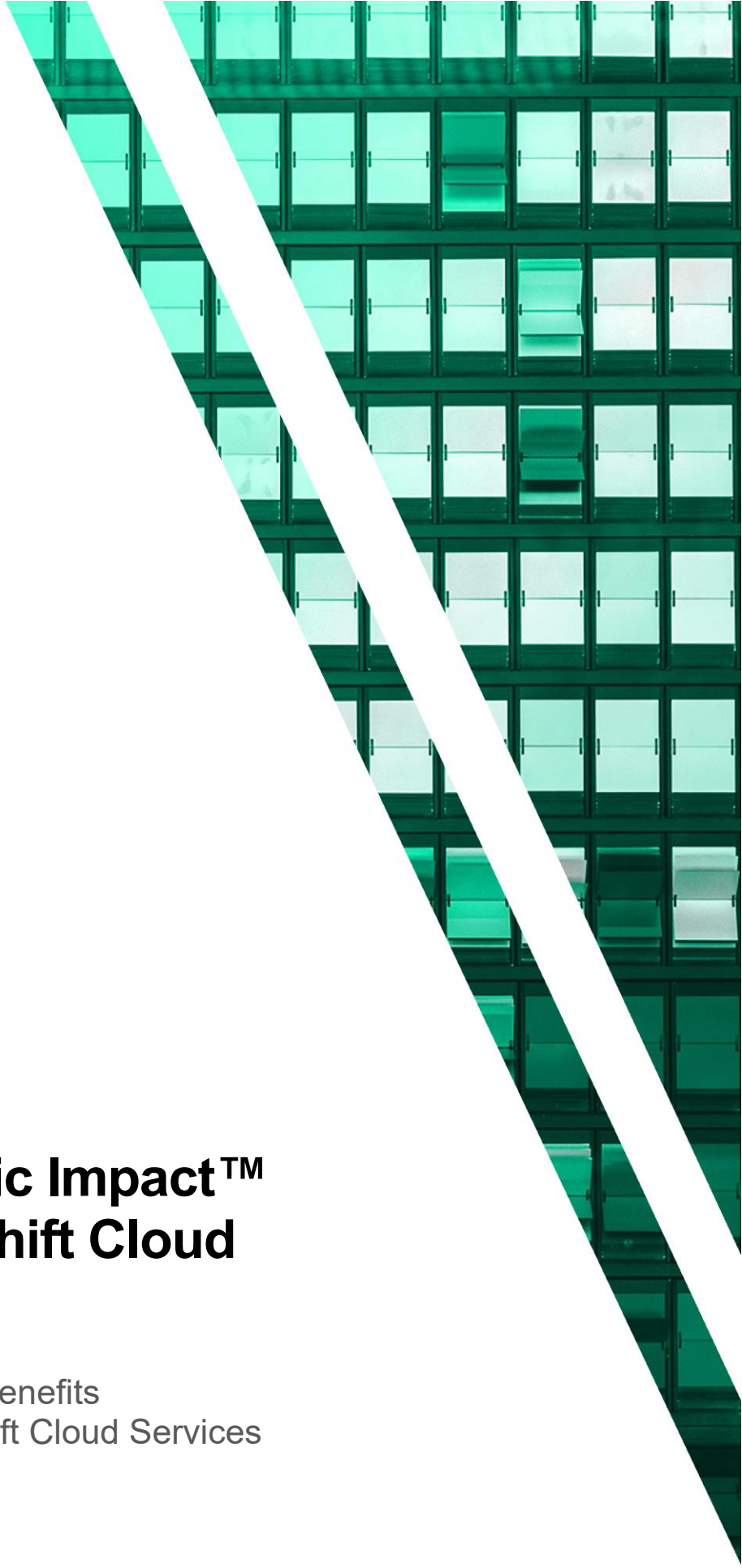

The Total Economic Impact™ Of Red Hat OpenShift Cloud Services

Cost Savings And Business Benefits Enabled By Red Hat OpenShift Cloud Services

FEBRUARY 2024

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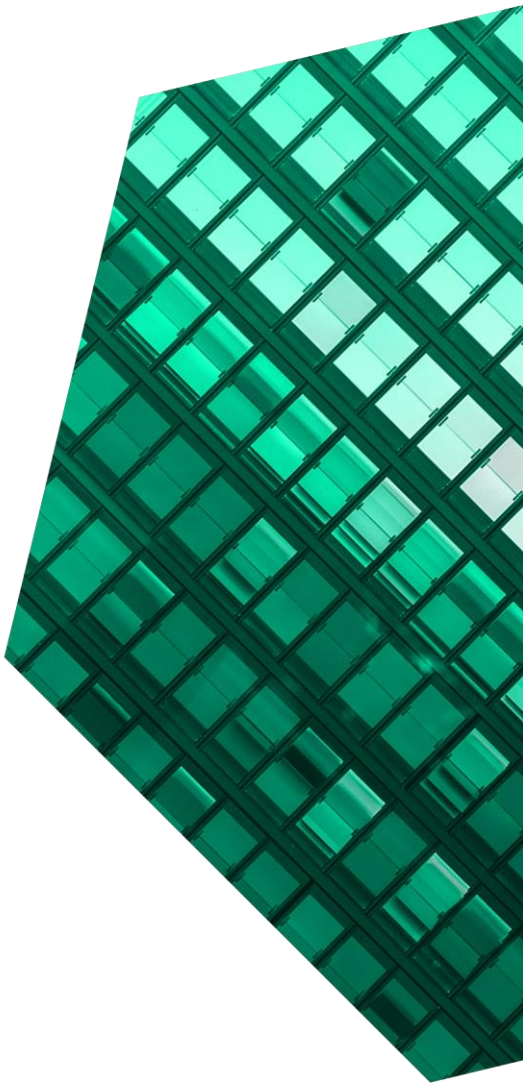

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Executive Summary

Enterprise organizations seek container development platforms that accelerate and simplify the development and operations of applications wherever and however firms build and deploy them. Therefore, multicloud container development platform customers look for a balanced blend of development and operations features that simplify cloud-native app development; enable distributed infrastructure operations; and expand enterprise value with rich app and service partner ecosystems.[1]

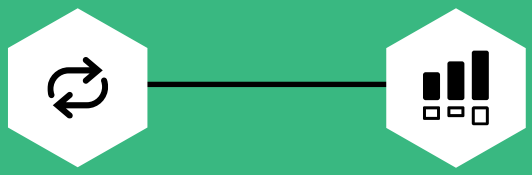
Red Hat OpenShift cloud services are an enterprise-grade application development platform that is jointly managed and supported by Red Hat and public cloud providers. Red Hat OpenShift cloud services enable application developers to build, deploy, and run traditional and cloud-native applications at scale. This enables enterprise IT organizations to deliver innovative applications and business value much faster.

Red Hat commissioned Forrester Consulting to conduct a Total Economic Impact™ (TEI) study and examine the potential return on investment (ROI) enterprises may realize by deploying Red Hat OpenShift cloud services.[2] The purpose of this study is to provide readers with a framework to evaluate the potential financial impact of OpenShift cloud services on their organizations.

To better understand the benefits, costs, and risks associated with this investment, Forrester interviewed 11 representatives with experience using OpenShift cloud services. For the purposes of this study, Forrester aggregated the interviewees' experiences and combined the results into a single composite organization that is a global operation that uses both Amazon Web Services (AWS) and Microsoft Azure clouds and has a basic knowledge of containers.

Prior to using Red Hat OpenShift cloud services, some interviewees already operated in the cloud, while several interviewees' organizations worked with on-premises, monolithic architectures. Previously,

KEY STATISTICS



Return on investment (ROI)
468%

Net present value (NPV)
$4.08M

developers at these organizations manually created and managed their environments. This meant additional DevOps resource time was allocated to manage the associated infrastructure. In doing so, critical resources were pulled away from core competencies, which slowed new releases, inhibited agility, stunted innovation, and delayed time to market. Therefore, the interviewees' organizations struggled to respond to changing business demands. Additionally, they faced rising operational and infrastructure costs driven by their legacy architecture.

After the investment in Red Hat OpenShift cloud services, interviewees' organizations cut down on operational overhead while gaining new flexibility from introducing or maturing containerization and outsourcing the ongoing management of clusters and tools. Key results from the investment included having a scalable, more reliable application platform without requiring investment in the core infrastructure

or skills needed to maintain the platform. The reduced time to market and increased developer productivity meant organizations using Red Hat OpenShift cloud services could do more with less.

KEY FINDINGS

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

- **Improved development velocity.** Using Red Hat OpenShift cloud services allows organizations to shorten their development cycle by up to 70%. Functions can be coded in fewer lines. Wait times are reduced with shorter provisioning and spin-up times. OpenShift enables increased autonomy with self-service tools, which improves developer productivity and accelerates product delivery. For the composite organization, the monetary benefit of a shorter development cycle is estimated at nearly $1.5 million over the three-year period for 300 applications.
- **Twenty percent of developer time is recaptured due to reduced infrastructure maintenance requirements.** Red Hat OpenShift cloud services eliminated the need for developers to maintain the application development infrastructure and allowed them to focus on innovation efforts. Resources have a shorter learning curve and acquire more transferable skills. Over the span of three years, the composite organization recaptures more than $2.1 million in developer time.
- **Fifty percent improvement in operational efficiency.** Since Red Hat OpenShift cloud services are managed services, the composite organization reassigns 50% of DevOps employees previously responsible for managing the infrastructure, including servicing during maintenance windows and repairing hardware. These employees now focus on higher-value work that improves customer experience and further differentiates the organization from competition. Outsourcing operational tasks also increases the quality control and consistency of those efforts. Over three years, this increased operational efficiency is valued at more than $1.3 million.

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

- **Developer satisfaction and retention.** Interviewees highlighted that developers benefited from Red Hat OpenShift cloud services by allowing them to break down updates into smaller pieces, reducing the pressure of extensive testing on a short timeline, and decreasing the need to respond to fire drills once in production. Additionally, developers had the flexibility to use both built-in or preferred cloud-native tools when experimenting with new multicloud and hybrid environments.
- **Improved security and reduced risk.** Interviewees shared how Red Hat OpenShift cloud services automated certain features and security updates, eliminating the need for manual maintenance while still ensuring that their environment is secure.
- **Improved elasticity.** Before Red Hat OpenShift, if capacity was reached, containers could shut down entirely, impacting back-end IT teams as well as customer experiences. With OpenShift, the platform dynamically scales servers up and down as needed without additional cost or time spent. The resulting savings are minimal compared to the contribution to innovation efforts.
- **Reduced total cost of ownership.** Interviewees explained that using tools baked into the OpenShift platform or associated with the larger cloud vendor ecosystem enabled their organizations to cut down on redundant tooling or time spent learning new tools. Interviewees'

organizations that previously operated an on-premises container platform saved on physical server costs as well as the associated annual support and licensing efficiencies and the costs dedicated to managing the platform.

- **Performance reliability.** Interviewees noted that using Red Hat OpenShift cloud services made their application platform more reliable over the long run, as there were fewer outages or system failures. Application resilience was maintained even while expanding the environment and resource usage. Application uptime was maintained without having to dedicate internal resources to 24x7 support.

Flexibility. Outside of quantified and unquantified benefits, implementing Red Hat OpenShift cloud services helped realize new use cases and business opportunities, including:

- **Elimination of bottlenecks for innovation.** With Red Hat OpenShift, developers focus on higher-level tasks like addressing business needs and delivering customer value, which positively impacts potential revenue. Furthermore, Red Hat resources, such as Black Belts, Customer Success Architects, and Cloud Services Consultants, help eliminate obstacles at platform implementation and assist in ongoing scale and replication efforts, such as expanding to multicloud environments.
- **Enabling cloud maturity through new OpenShift functionality, leveraging AI, and supporting environmental, social, and governance (ESG) use cases.** Fewer platform restrictions and more flexibility for developers means there are fewer barriers to migrating legacy applications to the cloud. AI/ML capabilities could be introduced into API-driven applications to enhance current use cases and expand into new areas, including ESG initiatives. Also, taking advantage of configuration options, such as hosted control planes, will further reduce costs.

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

- **Red Hat fees.** The fees paid to Red Hat consist of the cost of consulting services, cluster cost, and cost of developer training. Over three years, accounting for year-to-year growth, the risk-adjusted PV of Red Hat fees is less than $526,000.
- **Labor costs of $96,000 for OpenShift training.** Thirty-five developers participate in several days of training for the OpenShift platform during implementation of the platform.
- **Ongoing administration of Red Hat OpenShift cloud services.** The composite organization assigns two FTEs to manage OpenShift. The project owner dedicates 40% of their time to leading the project and serving as the day-to-day contact for Red Hat. This represents $251,000 in costs to the organization.

The representative interviews and financial analysis found that a composite organization experiences benefits of $4.95 million over three years versus costs of $872,000, adding up to a net present value (NPV) of $4.08 million and an ROI of 468%.

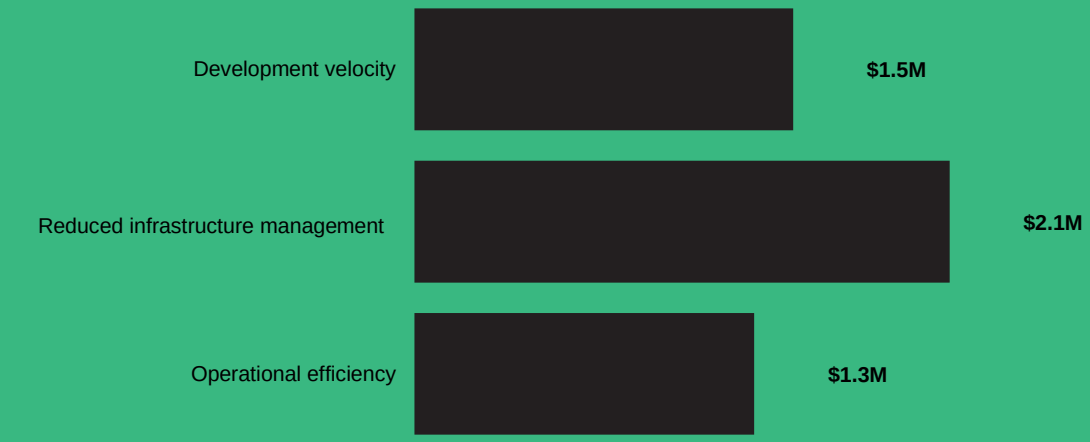
ROI
468%

BENEFITS PV
$4.95M

NPV
$4.08M

PAYBACK
<6 months

Benefits (Three-Year)



“[Before Red Hat OpenShift cloud services,] we had self-managed data centers and we acknowledged that we were not in the business of managing data centers. We also perceived that retaining talent and getting talent with the skills to manage container solutions is hard for us and not our core business. We looked at some competitors [to Red Hat], but we did not want to marry a cloud vendor and they didn’t come with the batteries included. That is specifically what we were looking for because, besides not being an infrastructure company, we’re also not a cloud platform company.”

— Head of cloud-native transformation, financial

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 Red Hat OpenShift cloud services.

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 Red Hat OpenShift cloud services can have on an organization.

DUE DILIGENCE

Interviewed Red Hat stakeholders and Forrester analysts to gather data relative to Red Hat OpenShift cloud services.

INTERVIEWS

Interviewed 11 representatives at organizations using Red Hat OpenShift cloud services 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 Cloud Services Customer Journey

Drivers leading to the OpenShift cloud services investment

Interviews

Role	Industry	Region	Number Of Applications On OpenShift
IT innovation manager IT system manager	Nonprofit education	HQ in Germany, operational in 100 countries	12+
Director of engineering	Conglomerate	HQ in US, operational worldwide	Hundreds
Director for operations and infrastructure	Telecom	HQ in Canada, operational in Canada	300
Project coordinator	Higher education	HQ in Chile, operational in the Americas	2 large applications with multiple components and subprocesses
Developer for IT product and sourcing	Apparel	HQ in Europe, operational worldwide	4 large applications with 40 components
IT infrastructure manager	Logistics	HQ in Argentina, operational in Brazil and Uruguay	30 to 35
Container platforms solutions architect	Energy	HQ in US, operational worldwide	Hundreds
Head of cloud-native transformation	Financial	HQ in Europe, operational worldwide	2 of 4 large products in production plus all net new projects
Product owner, container platform	Financial	HQ in Europe, operational worldwide	200 legacy applications migrated plus all net new projects
Solutions architect	Higher education	HQ in US, operational in US	50 legacy applications migrated plus 3 native cloud projects

KEY CHALLENGES

There are variations in what a prior environment looks like for Red Hat OpenShift cloud services customers. Some had monolithic applications and supporting servers that required manual management. Others were already starting to move towards microservices and hybrid cloud strategies.

Despite their different origins, the interviewees all struggled with common challenges, including the following:

- **Monolithic applications were costly and time-consuming to maintain and upgrade.** Interviewees noted that the operational overhead to maintain and upgrade their prior monolithic architecture was too costly and time-consuming. The director of engineering at a conglomerate shared: “[We had] a ton of applications running on our environment, which had to go through various test and validation sequences. Our environment had to be updated every quarter, so we were constantly upgrading. Eventually, it became very expensive and time-consuming to

> **“One of our pain points is we don’t want to do infrastructure. We just want to focus on building great experiences. We wanted to find somebody who could manage this for us, so we didn’t have to.”**
>
> *Director for operations and infrastructure, telecom*

keep upgrading. From an operational standpoint, [we wanted] to give that ball to someone else." Many interviewees also faced the added costs of technical debt for prior solutions that were end of life.

- **Limited resource capacity and lack of in-house experience with containers.** While interviewees wanted to employ microservices, they worried it would require significant resources in implementation and integration, and those resources could be better spent focusing on their organizations' core business rather than managing infrastructure. Additionally, existing tools and infrastructure lacked inherent security and compliance capabilities that left their organizations vulnerable to breaches, downtime events, noncompliance, and inhibited scaling environments to meet business demands.
- **Long application lifecycle and lack of agility restricted ability to innovate and meet evolving business objectives.** Despite time spent on operational and maintenance tasks, prior environments remained restrictive, blocking access to necessary tools and solutions for technical teams. Legacy monolithic applications and processes, along with slow development cycles, caused the interviewees' organizations to struggle to support continually changing business requirements. Time and money spent operating prior environments ultimately distracted resources from building cloud-native applications.

"Comparing Red Hat OpenShift to our old environment is apples to oranges. In the old environment, [we] restricted everything. Now suddenly engineers have freedom of choice [in their tools], and that in itself is extremely valuable in building better architecture."

Head of cloud-native transformation, financial

"For us, the direction is to be fully supported by a partnership [with Red Hat OpenShift cloud services], so we can concentrate on the core of our business. Our core is education. And education is supported by infrastructure, but I'm not in the business of the technology."

Project coordinator, higher education

SOLUTION REQUIREMENTS

While searching for a solution to address the challenges noted above, the interviewed decision-makers conducted due diligence and developed a list of functional and nonfunctional requirements with which to evaluate vendor platforms. The interviewees searched for a solution that fit the following criteria:

- **A turnkey solution that integrates development capabilities and management tools.** The innovation manager in nonprofit education said: "There was a need for a platform that developers could easily use. Something they can interact with and be productive with their applications from the beginning." Interviewees wanted key features integrated, such as deployment pipelines and security components, so that guardrails could be implemented without hindering developer productivity.

- **A managed service with robust support so they can focus on build activities.** Interviewees looked for solutions that were externally managed. The developer at an apparel firm shared: “We needed to have support because it was a fresh start, a new technology. We had to have someone who we can lean on, and that’s why we picked the managed version and the support.” This included global site reliability engineer (SRE) expertise to automate deployment and maintenance, preconfigure built-in tools, and proactively monitor and manage the environment.
- **Cloud-native, joint solutions with leading cloud providers.** As part of their managed solution requirements, many interviewees searched for a platform that could be deployed on the public cloud because of familiarity with cloud tools and previous financial commitments. The interviewees’ organizations leveraged the expertise from Red Hat and its long-standing relationship with the cloud providers. As the product owner of container platform at a financial firm explained, “We switched to ROSA [Red Hat OpenShift Service on AWS] because in the future, we might not have the knowledge required to manage cluster setups in house, especially in some of the regions we operate in.”
- **Cloud vendor-agnostic solution.** Despite requiring a managed service that had robust support and an integrated partner ecosystem, interviewees also valued future flexibility. Interviewees wanted a managed solution that was also vendor-agnostic. The head of cloud-native transformation at a financial organization stated: “OpenShift stood out by design already because it’s cloud vendor agnostic and it is assembled by the best of breed of Open Source. It also does not require vendor lock on Red Hat.”
- **Flexibility and scalability.** Interviewees wanted a solution that could adapt to their evolving business needs. The IT infrastructure manager in logistics said, “[We looked for] the capability to add and remove capacity depending on demand — something that can grow when our business grows or reduce capacity when it’s not needed.”
- **Cost-effectiveness and ability to reduce operational overhead.** Cost was a key factor when comparing Red Hat OpenShift cloud services with other alternatives. The director of engineering at a conglomerate explained, “With OpenShift [cloud services], we are saving hundreds of thousands of dollars in operational overhead in the process.” Specifically, many interviewees did the analysis to determine if it made sense to manage their Kubernetes solutions in-house. The interviewees agreed that this would only add to operational overhead and continue to perpetuate existing challenges in their environments. A product owner of container platform at a financial company put it simply, “We did the math, and using Red Hat OpenShift was one-third of the cost compared to trying to run a Kubernetes environment internally.”

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 11 interviewees, and it is used to present the aggregate financial analysis in the next section. The composite organization has the following characteristics:

Description of composite. The organization has an annual revenue of $10 billion to $15 billion. It has a global operation with 20,000 employees. Its development team has 70 developers working with containers and 10 DevOps professionals supporting this effort. The organization uses both Amazon Web Services (AWS) and Microsoft Azure clouds and has basic knowledge of containers but limited Kubernetes experience. The organization has a cloud-first

strategy for the future and is implementing a combination of migrating and replatforming applications to Kubernetes and creating new cloud-native applications.

Deployment characteristics. The organization starts with 100 applications on OpenShift in Year 1, and it builds more applications in Years 2 and 3. Implementation of Red Hat OpenShift cloud services involves training.

Key Assumptions

- **20,000 employees**
- **$10 billion+ in annual revenue**
- **Global organization**
- **70 developers**
- **10 DevOps professionals**

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	Development velocity	$280,800	$608,400	$982,800	$1,872,000	$1,496,475
Btr	Reduced infrastructure management	$850,500	$850,500	$850,500	$2,551,500	$2,115,068
Ctr	Operational efficiency	$540,000	$540,000	$540,000	$1,620,000	$1,342,900
	Total benefits (risk-adjusted)	$1,671,300	$1,998,900	$2,373,300	$6,043,500	$4,954,443

DEVELOPMENT VELOCITY

Evidence and data. Before investing in Red Hat OpenShift cloud services, some interviewees were using containers, but most were not using a microservices-based architecture; applications were large, burdensome, and expensive to manage. Moving to container-based architecture, interviewees' organizations began to modernize legacy applications with microservices. Using Red Hat OpenShift cloud services vastly accelerated their application development and testing process in various ways, such as expediting time required to spin-up environments, which freed up developer time to focus on higher-value activities. Additionally, the platform was intuitive, came with familiar, integrated tools (while allowing those tools to be swapped for any preferred AWS or Azure-native tools), and offered more transparency into underlying data sources. These components expedited lead times on development and enabled faster onboarding into the development process.

- A head of cloud-native transformation at a financial organization pointed to expedited environment deployment and faster time to test as contributors to development velocity by as much as two weeks with Red Hat OpenShift cloud services: "It takes 5 minutes to spin-up a test environment now, where it could have been a ticket to the operations team and a two-week wait before [Red Hat OpenShift]."
- A solutions architect in higher education corroborated this sentiment by sharing that the intuitive experience delivered by the Red Hat OpenShift platform and deployment templates contributed to faster time to testing: "Red Hat OpenShift has a user interface unlike Kubernetes so, naturally, there is less of a learning curve. We can use templates to develop pipelines for applications and push to the test environment by day two."
- A head of cloud-native transformation at a financial organization indicated that the built-in guardrails, such as around security and permissions, as well as the better user interface, available templates, and familiar toolsets contributed to greater developer self-sufficiency, both automated and streamlined development processes.
- A product owner of container platform at a different financial organization was able to spin-up environments, quickly decreasing development timelines. With Red Hat OpenShift, their organization eliminated extended deployment times previously associated with

provisioning virtual machines [VMs]. They stated, "With Red Hat OpenShift, we do not have to wait for teams to provision VMs, so the lead time for development timelines goes from three months to 5 minutes."

- A director in telecom correlated developer productivity improvements with faster release cycles and higher volumes of releases per cycle. They stated: "Previously, we were only able to release every two weeks. Now, we do thousands of releases a day. We now do very fast releases of very small changes. Additionally, in the previous environment, the average developer would have had to wait two to three weeks just to get developers set up with workspaces. This would happen every two weeks."
- The developer in apparel said: "You reduce the lines of code you have to monitor when you change things. This means smaller, faster release cycles, which means [the] business gets new features faster. We are more flexible in setting up new applications and new models because it's less code to get started."
- The IT infrastructure manager in logistics added, "We can now quickly scale up if needed, which opens up 50% of additional time in our development team."
- The project coordinator in higher education confirmed this acceleration, noting, "Our whole process is now 50% faster, which leads to our developers being more productive."

Modeling and assumptions. To capture this benefit for the composite organization, Forrester assumes:

- Over the course of three years, the organization goes from 100 to 300 applications developed and managed on OpenShift.
- The average development time in the previous environment per application dedicated to building images, testing, maintenance, and security in the legacy environment is 160 hours.
- Using OpenShift allows a 60% reduction in development time in Year 1, 65% in Year 2, and 70% in Year 3.
- The hourly rate of an FTE developer is $65.
- A 50% productivity recapture rate is introduced, which assumes that not all of the newfound free time will be reallocated as increased developer productivity.

Risks. The benefit of developer productivity lift from faster time to market may vary and specific considerations include:

- The number of applications developed and managed in Red Hat OpenShift.
- The complexity of the applications developed and managed.
- The geographic region, which impacts the hourly rate of an FTE developer.

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

> **"We can give our engineers a lot of autonomy thanks to the guardrails available in Red Hat OpenShift, and we have automated a lot of the human handoffs required between teams which has saved weeks on lead time delays."**
>
> *Head of cloud-native transformation, financial*

Development Velocity					
Ref.	**Metric**	**Source**	**Year 1**	**Year 2**	**Year 3**
A1	Number of applications on Red Hat OpenShift	Composite	100	200	300
A2	Average development time in previous environment per application dedicated to building images, testing, maintenance, and security in legacy environment (hours)	Interview (original study)	160	160	160
A3	Reduction of development time due to Red Hat OpenShift cloud services	Composite	60%	65%	70%
A4	Hourly rate of developer FTE (rounded)	$135,000/2,080 hours	$65	$65	$65
A5	Productivity recapture	Assumption	50%	50%	50%
At	Development velocity	A1*A2*A3*A4*A5	$312,000	$676,000	$1,092,000
	Risk adjustment	↓10%			
Atr	Development velocity (risk-adjusted)		$280,800	$608,400	$982,800
	Three-year total: $1,872,000			**Three-year present value: $1,496,475**	

REDUCED INFRASTRUCTURE MANAGEMENT

Evidence and data. Beyond slowing down the development process, legacy environments also required developers to procure new environments manually, which could take weeks and involve multiple stakeholders. During the new environment spin-up, developers were limited in their ability to progress further on projects. Interviewees shared that with Red Hat OpenShift cloud services, they no longer needed their developers to allocate time for infrastructure maintenance work, which was as much as 20% of their time in the previous environment.

After implementing Red Hat OpenShift cloud services, developer time savings were repurposed for more productive work supporting application development. Refocusing developer time away from infrastructure maintenance to focus on building and innovating meant resources were more substitutable across the enterprise and could be moved across development teams and applications with ease. Additionally, prior infrastructure tasks required skills that were difficult to hire for and retain. With Red Hat OpenShift, organizations no longer faced these talent constraints that delayed development timelines to accommodate hiring timelines and resource training times.

- A container platform solutions architect in energy cited more transferrable skills for developers resulting from the Red Hat OpenShift investment: “The skill sets our [developer] resources have now are more marketable across the enterprise, so we can move resources across teams with ease.” Moving resources easily across

“The skill sets our developers have now are more marketable across the enterprise, so we can move resources across teams with ease.”

Container platform solutions architect, energy

development teams helped to transfer knowledge across groups and reduced the impact of skills gaps and capacity constraints.

- A product owner of container platforms at a financial organization attributed the more transferrable developer skills and being able to build a more fungible developer resource set to furthering their organization's future scale. They stated: "From a company perspective, to find people who are firm with Kubernetes or OpenShift is not easy where we are. [With Red Hat OpenShift,] we can transfer some responsibility to get the cluster up and running to the vendor. In the future, we might not have the knowledge in house, but we can spin-up more clusters in more countries without having to hire experts in those geographical locations. It allows us the ability to scale without adding hard to find resources to our team."
- The head of cloud-native transformation at a financial organization shared: "We have shifted the type of resources we needed away from DBA [database administrator] resources and network engineers. It's fewer people with screwdrivers."
- The director in telecom explained: "Previously, developers had to build the instances themselves. It would probably be a fifth of developer time [dedicated for infrastructure maintenance]." They continued: "Developers shouldn't care [about infrastructure]. They should press a button, and it should be in production."
- The project coordinator in higher education shared, "Developers can now spend more time with customers trying to figure out what they need."

Modeling and assumptions. To capture this benefit for the composite organization, Forrester assumes:

- Seventy developers as part of the development team.
- Twenty percent of development time that was previously spent to maintain the infrastructure is recouped.
- The average developer fully burdened salary in the US is $135,000 per year.
- A 50% productivity recapture rate is introduced, which assumes that not all of the newfound free time will be reintroduced as increased developer productivity.

Risks. The benefit of recaptured developer time from infrastructure maintenance work may vary, and specific considerations include:

- The size of the development organization.
- The skill set and knowledge within the development organization.
- The geographic region, which impacts the average developer burdened salary.

Results. To account for these risks, Forrester adjusted this benefit downward by 10%, yielding a three-year, risk-adjusted total PV of $2.1 million.

Developer time recouped from elimination of infrastructure maintenance work with Red Hat OpenShift cloud services

20%

Reduced Infrastructure Management					
Ref.	**Metric**	**Source**	**Year 1**	**Year 2**	**Year 3**
B1	Number of developers	Composite	70	70	70
B2	Percentage of developer time recouped from elimination of infrastructure maintenance work	Interview	20%	20%	20%
B3	Average annual fully burdened salary for a US developer	Assumption	$135,000	$135,000	$135,000
B4	Productivity recapture	Assumption	50%	50%	50%
Bt	Reduced infrastructure management	B1*B2*B3*B4	$945,000	$945,000	$945,000
	Risk adjustment	↓10%			
Btr	Reduced infrastructure management (risk-adjusted)		$850,500	$850,500	$850,500
	Three-year total: $2,551,500			**Three-year present value: $2,115,068**	

OPERATIONAL EFFICIENCY

Evidence and data. Using Red Hat OpenShift cloud services meant native operational tools for security and governance tasks could be used. In doing so, full-time DevOps staff who were responsible for managing the infrastructure could shift to focus on higher-value customer enablement activities. Additionally, the interviewees' organizations did not have to allocate as many DevOps staff to maintain the environment for application development, including servicing maintenance windows and conducting hardware repairs. Outsourcing this work also contributed to more consistency in both how the work was conducted and expected outcomes.

- A container platform solution architect at an energy organization indicated that their organization redirected five FTEs away from operational activities.
- A head of cloud-native transformation at a financial organization reduced required operational FTEs by 30% to go from 10 FTEs, down to seven FTEs. They added, "Our out-of-pocket costs when you compare vendor to vendor is similar to our prior state. However, today, we get way more for what we pay for, and it's reflected in the resource impact from not having to do the management, the batching, the security processes ourselves."
- A product owner of container platforms at a different financial organization reduced the use of eight to 10 operational FTEs before Red Hat OpenShift, down to using three FTEs in the new environment.

> **"With Red Hat OpenShift cloud services, we don't have to create new servers or install anything. We can focus on other things. The workload shifted from doing infrastructure maintenance to supporting application development."**
>
> *IT innovation manager, nonprofit education*

- The director of engineering at a conglomerate organization stated: “We had two FTE engineers managing [our legacy solution], building the clusters, [and] managing the clusters, including the day-to-day caring and feeding. Now, those folks get to focus more on the actual use of OpenShift in helping our development teams and operations teams leverage the capabilities within OpenShift.”
- The project coordinator in higher education added, “We reassigned 25% [of] people out of operations and into development.”
- The director in telecom said, “Before [OpenShift cloud services] we had 10 to 12 team members with the right experience managing infrastructure. Of the 10 to 12, three or four stayed doing what they were doing while the other team members took on lead positions within their application owners’ teams.”
- Within a conglomerate organization, two FTEs were previously tasked to support application development process for a team within the organization, and with the onboarding of Red Hat OpenShift cloud services, both of those were reassigned.

Modeling and assumptions. To capture this benefit for the composite organization, Forrester assumes:

- The organization’s DevOps team supporting application development on containers consists of 10 professionals.
- Red Hat OpenShift cloud services take on infrastructure management and thus allows the reassignment of 50% of these FTEs to other roles within the organization.
- The DevOps fully burdened annual salary in the US is $120,000.

Risks. The benefit of cost avoidance from increased operational efficiency may vary, and specific considerations include:

- The complexity of the application development environment, which impacts the number of DevOps professionals needed to maintain it.
- The training and change management required to get the organization quickly adopting and incorporating Red Hat OpenShift cloud into their process, which can impact how quickly DevOps professionals can be repurposed.
- The geographic region, which impacts the average DevOps burdened salary.

Results. To account for these risks, Forrester adjusted this benefit downward by 10%, yielding a three-year, risk-adjusted total PV of $1.3 million.

Operational Efficiency					
Ref.	**Metric**	**Source**	**Year 1**	**Year 2**	**Year 3**
C1	Number of DevOps FTEs	Interview	10	10	10
C2	Reduction in infrastructure management effort with Red Hat OpenShift cloud services	Interview	50%	50%	50%
C3	DevOps employees reassigned	C1*C2	5.0	5.0	5.0
C4	DevOps annual fully burdened salary (US)	Industry average	$120,000	$120,000	$120,000
Ct	Operational efficiency	C3*C4	$600,000	$600,000	$600,000
	Risk adjustment	↓10%			
Ctr	Operational efficiency (risk-adjusted)		$540,000	$540,000	$540,000
	Three-year total: $1,620,000			**Three-year present value: $1,342,900**	

UNQUANTIFIED BENEFITS

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

- **Developer satisfaction and retention.** Organizations that transitioned to Red Hat OpenShift cloud services saw the impact of using this service on the happiness of their developers. The director in telecom said: “Well-being and retention of developers is another big benefit. Developers are happier because there is less pressure for developers to get everything right in a small window. Now, we can do small changes more frequently.” A product owner of container platforms at a financial organization agreed that they delivered on more developer requests and requirements now as they had the flexibility to provision developers with familiar tools. This also enabled developers more time, tools, and autonomy to experiment with multicloud or hybrid clould environments.
- **Improved security and reduced risk.** Interviewees noted security improvements that Red Hat OpenShift cloud services enabled, which made their environment less risky than before. The developer at an apparel company explained: “Before managed services, we ran major security updates twice a year. Now, we are able to use tools to automatically scan for used packages. Every time we deploy, the libraries are scanned for [vulnerabilities].” Interviewees also noted benefits of having built in tooling that inherently elevated security considerations throughout the development process for cloud-native apps versus leaving it to an afterthought. A product owner of container platforms at a financial organization stated: “If you look at [Red Hat OpenShift], how it is designed and implemented, out of the box you get security features such as for access control. So, you do not have to care about implementing something new if you are a developer today.”
- **Improved elasticity.** The head of cloud-native transformation at a financial organization experienced the benefit of flexible capacity provisioning with Red Hat OpenShift. They saw additional cost savings from being able to dynamically scale servers down as needed and could support innovative computations that provided more value to the business when they

scaled servers up. They stated: “We can ask Red Hat to provision a VM at any time of day. Our business has peaks where computations sometimes require more CPU versus others. To dynamically scale up and scale down our server park is very useful for us and where we were historically always resource constrained in how many servers fit in the rack of the data center we manage. We now have the flexibility to expand and to shrink whenever we want. So that’s a very big cost savings but also it allows us to do computations we could have never done before.” A solutions architect in higher ed explained the impact of the before state: “Prior on-premises platforms were not elastic. If capacity was reached, the containers shut down due to lack of memory.”

- **Reduced total cost of ownership.** Interviewees agreed that utilizing tools baked into the OpenShift platform or associated with the larger cloud vendor ecosystem enabled them to cut down on redundant tooling, and that produced cost savings. Organizations that had previously used an on-premises container platform also saved on physical server costs and the associated annual support and licensing.
- **Performance reliability.** Using Red Hat OpenShift cloud services made the system and overall application development infrastructure more reliable, with a noted lack of system failures and outages. Additionally, interviewees cited the use of cross-tooling that added a layer of redundancy capabilities that further mitigated the impact of certain events. The director in telecom said: “Previously, you had instances that were manually managed, and there was a high likelihood of those instances failing or something happening to them. In our previous environment, we would have interruptions at least once a week. Now, with our application scaled [and] a 10x increase in traffic to website, we never had any outages during that whole time.” A container platforms solution architect in the energy industry also improved platform and application performance, indicating, “We are now avoiding a couple incidents a year that would impact either internal employees or external customers.”

“[With Red Hat OpenShift cloud services], business gets features faster. We are more flexible in setting up a new application [or] new models faster because it's less code to get started.”

Developer for IT product and sourcing, apparel

FLEXIBILITY

The value of flexibility is unique to each customer. There are multiple scenarios in which a customer might implement Red Hat OpenShift cloud services and later realize additional uses and business opportunities, including:

- **Elimination of bottlenecks for innovation.** With Red Hat OpenShift cloud services, teams shifted their efforts from configuring and maintaining environments to focusing on responding to business needs and delivering customer value. With OpenShift, they improved existing products and created new products for additional revenue streams. At the start of implementation of a new project the Red Hat Black Belt, Customer Success, and Consulting Services teams eliminated obstacles and helped with ongoing scale and replication efforts. For example, a container platforms solutions architect at an energy organization that currently deploys Red Hat OpenShift with a single cloud provider noted that their organization is considering adding clusters from a different cloud provider to help

move more applications from prior on-premises environments to the cloud. Black Belt and Customer Success resources have reference architecture and design templates to help meet network security needs and control mandates necessary for public cloud.

- **Future cloud maturity, including incorporating additional OpenShift functionality, leveraging AI, and supporting ESG use cases.** Innovation bottlenecks were eliminated. Subsequently, the interviewees' organizations shifted focus to forward-looking initiatives such as maturing their cloud strategies, supporting new revenue-generating applications, and introducing cutting-edge technology to better serve infrastructure teams, developer resources, and end users alike. Some examples include:
    - **Maturing cloud transformation efforts.** A container platforms solutions architect at an energy organization credited the investment in Red Hat OpenShift to providing their organization a path forward for their cloud transformation strategy. They stated: "The flexibility afforded that we have shifted to a cloud-first mindset. We are not just talking the talk. It hasn't been easy — we've been around 140 years, and we have a lot of legacy applications. Now, we have a legit path to move those applications." The interviewee indicated that their organization will be able to migrate 90% to 95% of its legacy applications with OpenShift.
    - **Leveraging AI capabilities.** The head of cloud-native transformation at a financial organization credited the improved elasticity of the Red Hat OpenShift environment with enabling their organization to leverage more cutting-edge technology. For example, their organization intends to include AI in its workloads for the complex computations that it builds and runs to support the analyses provided through its consultancy services with more data. The interviewee stated, "The computations we do are heavy and, with the new elasticity we have with Red Hat OpenShift, we're able to make them heavier by training AI models to support our consultancy work with reinforcement learning." The interviewee indicated that they have this capability on their roadmap and expect it to be in production within two years — a drastically accelerated timeline.
    - **Supporting calculations that promote ESG initiatives.** The same interviewee at a financial organization provided an example of the type of initiative that will be possible once AI is introduced to support their organization's financial modeling efforts. The AI models will support two initiatives in the ESG space. For one, the interviewee's organization plans to build a carbon emissions calculator for clients that will bring in new revenue streams.

      The same interviewee's organization also plans to build a carbon-aware workload scheduler internally to reduce the organization's carbon footprint by taking both time zone and geographic conditions into consideration when selecting a cluster to run, which could help reduce overhead. The interviewee stated: "We advise our clients a lot about carbon emissions and how financial risk and climate risk are correlated. To give that advice, it also makes sense to report in the kilos of carbon we use to compute these conclusions. So, we are building a carbon-aware workload scheduler to reduce the carbon emissions of our

workloads. That's something we never could have done without Red Hat OpenShift."

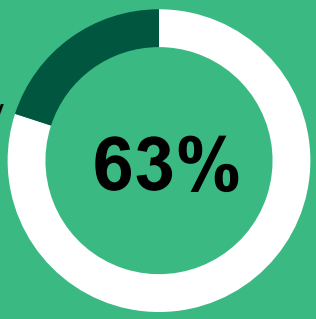
- **Portability and business continuity.** Interviewees noted that Red Hat OpenShift cloud services allowed a degree of flexibility and portability that ensured business continuity. OpenShift is based on open-source Kubernetes, empowering developers with a broad community and variety of interoperable services, and it offers a consistent OpenShift experience across the hybrid cloud. The IT infrastructure manager in logistics said, "We can keep our infrastructure running in different sites, which is helpful for our disaster recovery strategy."

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

SPOTLIGHT: PLATFORM ENGINEERING TEAMS

Forrester 2022 data shows that 63% of digital and IT professionals say increasing IT delivery speed is a high priority for their organization in the next 12 months.[3] The data also indicates that failure to respond to these pressures will diminish IT's contributions to business outcomes as well as dishearten the employees impacted by unresponsive services. Unfortunately, many technology leaders continue to struggle to increase development velocity.

IT professionals say increasing IT delivery speed is a high priority.



Enter platform engineering teams. Forrester Research sees platform engineering teams as more than just another cog in the IT machine, but as a fundamental part of the organization's technology strategy. These teams are responsible for building and maintaining a self-service portal with curated tools and processes for developers, which eliminates developers' need to provision, adopt, and integrate these technologies on their own.[4] Platform engineering teams emerge as the best way to get high-touch service, technical provisioning, or deep knowledge work done. Therefore, platform engineering teams play a pivotal role in the transformation from traditional to agile operations, serving as a force multiplier and an accelerator for other teams, as well as enhancing the efficiency and effectiveness of different departments — developers and DevOps included.

Platform Engineering Benefits

Benefits of Red Hat OpenShift cloud services for platform engineering teams include:

- **Streamlined application delivery.** The self-service internal developer platform allows teams to consume best practices without onboarding applications and developers, resulting in faster and more efficient delivery.
- **Increased collaboration and release velocity**. OpenShift's standardized environment allows development teams to release applications faster with consistent, compatible workloads across dev-test, staging, and production.
- **Improved release quality and productivity.** OpenShift alleviates the need to constantly configure and maintain infrastructure by automating application build and deployment to a declarative, immutable state.
- **Reliable, highly performant user experiences**. OpenShift provides logging, monitoring, and performance management tools out of the box, so engineers can proactively manage apps and address intermittent service failures quickly.

As a result of these benefits, interviewees said they have kept platform teams small, despite expanding environments. For instance, the head of cloud-native transformation at a financial organization stated: "One way we keep our platform team small is to support technologies that are supported by our platform vendor. If we need to fulfil a desire from one of the engineers, we look at what is supported by Red Hat and that's usually what we go with because we know these technologies will always work in harmony with our OpenShift stack."

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**
Etr	Red Hat fees	$394,800	$27,300	$54,600	$80,850	$557,550	$525,486
Ftr	Labor costs for OpenShift training	$95,550	$0	$0	$0	$95,550	$95,550
Gtr	Dedicated program lead	$0	$100,800	$100,800	$100,800	$302,400	$250,675
	Total costs (risk-adjusted)	$490,350	$128,100	$155,400	$181,650	$955,500	$871,711

RED HAT FEES

Evidence and data. Included in this cost category are a variety of components, all of which are paid to Red Hat. Many of the items noted below are considered add-ons to the platform.

- **Professional services implementation consulting.** Interviewees generally agreed that their organizations used third-party consultants to help them with both container adoption and application services implementation.
- **Multiple availability-zone base cluster**. Each new Red Hat OpenShift cluster is installed in a single region, with the option to deploy in a single availability zone or across multiple availability zones.
- **Red Hat-provided training.** Developers who planned to work with containers participated in training to become comfortable with the technology.

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

- The Red Hat fees for the composite consist of consulting services of $250,000 prior to full rollout.
- The composite organization also pays $26,000 to $77,000 per year for multiple availability-zone base clusters (three master, two infrastructure, 24 worker).
- A Red Hat-delivered training has a one-time cost of $126,000.

Risks. The following factors could affect the total Red Hat fees for an organization:

- The use case of Red Hat OpenShift cloud services at the organization.
- The number of regions covered by the solution.
- Professional services implementation consulting costs will vary depending on the prior environment, the scope of the implementation, and the availability of internal resources to support the initiative.

Results. To account for these risks, Forrester adjusted this cost upward by 5%, yielding a three-year, risk-adjusted total PV (discounted at 10%) of $526,000.

Red Hat Fees						
Ref.	**Metric**	**Source**	**Initial**	**Year 1**	**Year 2**	**Year 3**
E1	Consulting services (container adoption, application services implementation)	List pricing	$250,000	$0	$0	$0
E2	Multiple availability-zone base cluster	List pricing		$26,000	$52,000	$77,000
E3	Red Hat delivered training	List pricing	$126,000	$0	$0	$0
Et	Red Hat fees	E1+E2+E3	$376,000	$26,000	$52,000	$77,000
	Risk adjustment	↑5%				
Etr	Red Hat fees (risk-adjusted)		$394,800	$27,300	$54,600	$80,850
	Three-year total: $557,550			**Three-year present value: $525,486**		

LABOR COSTS FOR OPENSHIFT TRAINING

Evidence and data. Red Hat offers online learning modules that the interviewees used to train their developers. Options include an online starter-tier training that provides a feel for how the platform works from a developer's perspective and an interactive learning portal where developers can experiment and learn OpenShift with a preconfigured instance. Interviewees noted that the training provided to their employees covered how to use Red Hat OpenShift cloud services and not how to manage the platform.

- The project coordinator in higher education noted: "We did a lot of training for our IT department and internal units to be able to work with OpenShift — to work with this more open agile system. Each training was about 20 to 25 people from the IT team. They spent about 40 hours in training."
- The developer at an apparel firm said: "We had two months of training and workshops involving two DevOps from our organization and one from our supplier, and then four developers from the supplier for one to two months."

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

- Thirty-five developers will participate in the training.
- The training will take 40 hours.
- The hourly rate of a developer is assumed to be $65.

Risks. The cost related to OpenShift training may vary depending on the following factors:

- The number of employees participating in training.
- The regions where the employees are located, impacting the burdened hourly rate of the employee.
- The complexity and use case of Red Hat OpenShift cloud at the organization, impacting the length of training required.

Results. To account for these risks, Forrester adjusted this cost upward by 5%, yielding a three-year, risk-adjusted total PV of $96,000.

Labor Costs For OpenShift Training						
Ref.	**Metric**	**Source**	**Initial**	**Year 1**	**Year 2**	**Year 3**
F1	Number of FTEs participating in free training	Composite	35			
F2	Hours of training	Interview	40			
F3	Hourly fully burdened rate for a developer FTE (rounded)	$135,000/2,080 hours	$65			
Ft	Labor costs for OpenShift training	E1*E2*E3	$91,000	$0	$0	$0
	Risk adjustment	↑5%				
Ftr	Labor costs for OpenShift training (risk-adjusted)		$95,550	$0	$0	$0
	Three-year total: $95,550			**Three-year present value: $95,550**		

DEDICATED PROGRAM LEAD

Evidence and data. Active relationship management and oversight of the Red Hat OpenShift cloud services are ongoing efforts that require organizations to assign internal staff to act as the dedicated admin.

- The IT system manager in nonprofit education said, “We have two people responsible for maintaining OpenShift from our side.”
- The director in telecom noted, “On an ongoing basis, we have one and a half to two people who are managing Red Hat OpenShift cloud services relationship today.”
- The project coordinator in higher education said, “We have two people in charge of managing the relationship with Red Hat, but it doesn’t take that much time.”
- The developer at an apparel company explained, “Currently, we have four people maintaining two clusters but only deploying applications and configurations.”

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

- Two FTEs as dedicated program leads.
- Forty percent of their time is spent on Red Hat OpenShift cloud services-related tasks.
- A DevOps’s professional’s fully burdened annual salary is $120,000.

Risks. The cost related to allocating a dedicated program lead for Red Hat OpenShift may vary depending on the following factors:

- The strategy and unique needs of each organization.
- Team structure.
- Oversight practice.

Results. To account for these risks, Forrester adjusted this cost upward by 5%, yielding a three-year, risk-adjusted total PV of $251,000.

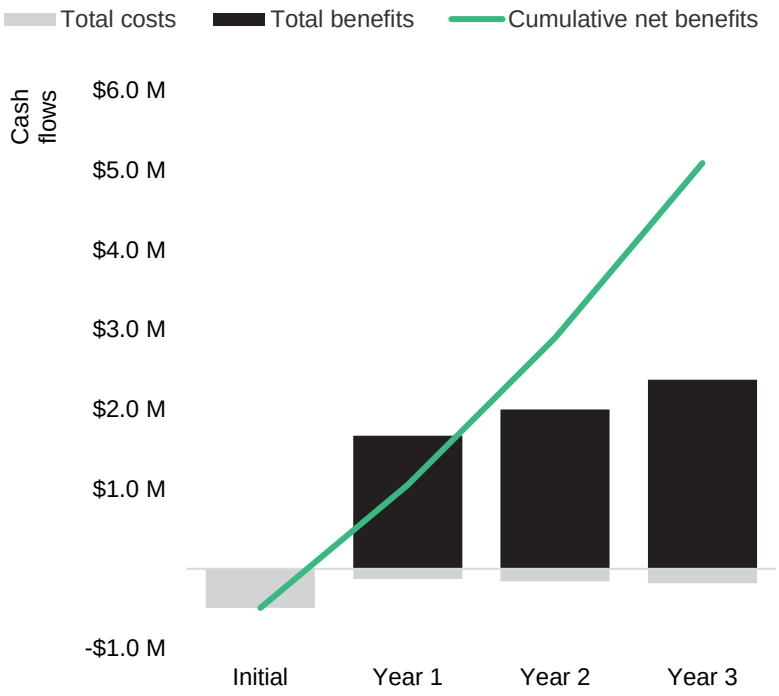
Dedicated Program Lead

Ref.	Metric	Source	Initial	Year 1	Year 2	Year 3
G1	Number of FTEs to manage OpenShift	Composite		2	2	2
G2	Percentage of time spent on OpenShift	Interview		40%	40%	40%
G3	Burdened salary of DevOps FTE	Assumption		$120,000	$120,000	$120,000
Gt	Dedicated program lead	G1*G2*G3	$0	$96,000	$96,000	$96,000
	Risk adjustment	↑5%				
Gtr	Dedicated program lead (risk-adjusted)		$0	$100,800	$100,800	$100,800
	Three-year total: $302,400			**Three-year present value: $250,675**		

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	($490,350)	($128,100)	($155,400)	($181,650)	($955,500)	($871,711)
Total benefits	$0	$1,671,300	$1,998,900	$2,373,300	$6,043,500	$4,954,443
Net benefits	($490,350)	$1,543,200	$1,843,500	$2,191,650	$5,088,000	$4,082,732
ROI						468%
Payback						<6 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: Endnotes

[1] Source: "The Forrester Wave™: Multicloud Container Development Platforms, Q3 2020," Forrester Research, Inc., September 15, 2020.

[2] 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.

[3] Source: "Navigating The New Terrain Of IT Platform Teams," Forrester Research, Inc., September 29, 2023.

[4] Ibid.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