The Business Value of an Agile and Flexible Platform for Developing and Running Applications with OpenShift on AWS

An IDC White Paper, Sponsored by Red Hat

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Business Value Highlights

661%
five-year ROI

5 months
to payback

54%
lower five-year cost of operations

>2x
more new applications per year

24%
higher application developer productivity

$32.9 million
higher revenue per year per organization

80%
less unplanned downtime

49%
more efficient IT infrastructure teams

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EXECUTIVE SUMMARY

Enterprises are rapidly moving to containers to develop and run their applications. Containers may be themselves a singular and simple foundational technology, but they have brought with them a large range of inherent attributes and benefits that taken together define a full container platform:

» Highly automated and agile orchestration with Kubernetes

» Transitioning from monolithic application architectures to microservices, which allows greater development efficiency and operational scalability and agility

» Shifting from waterfall software development to agile development

» Breaking down development and operations barriers with DevOps teams

» Operational transition to immutable infrastructures

As enterprises adopt containers, they are really adopting a broad set of technologies and making fundamental changes to their applications and processes. However, this doesn't all happen at once, and enterprises will be making this transition for many years. Existing applications can be containerized with benefits and then gradually refactored with microservices over time to improve returns. Ultimately, container technology is a key tool to help enterprises achieve digital transformation by greatly increasing the pace of software development, iteration, and innovation.

Containers and public cloud have always had great synergy. Containers were developed to take advantage of cloud infrastructure in order to meet the needs of cloud-native applications. Technologies like Docker and Kubernetes operate at the application level and a robust, scalable infrastructure is needed underneath. Hyperscale public clouds offer globally available and nearly infinitely scalable and resilient

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Organizations are capturing strong value through their investment in OpenShift on AWS, which IDC projects will have a value of $10.89 million per organization per year.

infrastructure. These clouds also offer a modern API-driven, infrastructure-as-code interface, which is why many customers choose to deploy their container platforms on the public cloud. The public cloud can also offer many application and data services that container developers often leverage in their code.

IDC spoke with organizations that are leveraging containerization and the public cloud by using Red Hat OpenShift on Amazon Web Services (AWS) to develop and run business applications. These organizations reported benefiting from combining a powerful and flexible platform for developing and running business applications (Red Hat OpenShift) with the agility, elasticity, and efficiency of the AWS cloud. With OpenShift on AWS, their development teams can better serve their businesses and they establish a more cost-effective and reliable IT platform for these applications. As a result, these organizations are capturing strong value through their investment in OpenShift on AWS, which IDC projects will have a value of $10.89 million per organization per year, by:

» **Enabling development teams** to better respond to business needs by delivering new applications and features more frequently and in less time, including across multicloud environments

» **Winning more business and increasing revenue** by reacting to opportunities in a timely manner and delivering higher quality services across disparate business locations

» **Increasing the productivity of employees** by minimizing the impact of outages affecting business applications

» **Reducing the amount of IT staff time** required to manage, support, and secure their IT environments

» **Lowering infrastructure and development platform costs** by moving to the AWS cloud and leveraging OpenShift functionality

Situation Overview

IDC forecasts that by 2021, there will be roughly 1.8 billion enterprise containers deployed, representing a five-year CAGR of 79% (see Figure 1). Container growth is primarily fueled by the pressure on enterprises to digitally transform. A key part of this transformation is to greatly increase the pace of software development and innovation. Containers are highly efficient at packaging applications, are portable, and have fast start-up and teardown times, making them a perfect fit to encapsulate cloud-native applications. In addition, containers enable a broad range of other

technologies and approaches such as automation/orchestration, microservices, continuous integration/continuous deployment (CI/CD), and immutable infrastructure.

FIGURE 1

Container Growth, 2016–2021

Container Instances, in millions
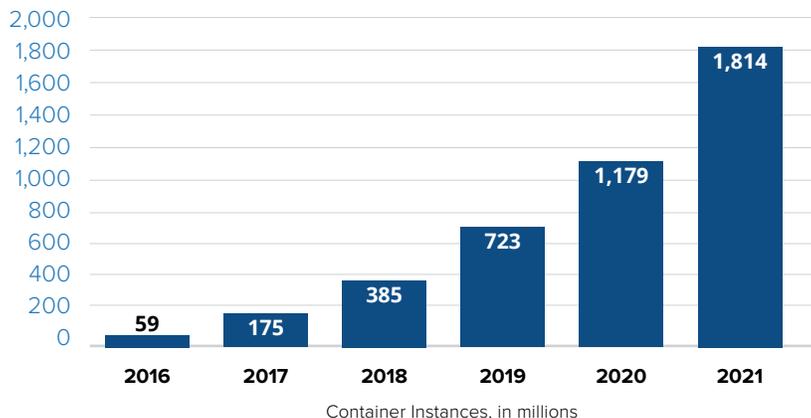
Source: IDC, 2019

Enterprises are adopting containers for several key use cases:

» **Accelerate application delivery:**

- Next-generation applications use a microservices architecture and containers are an ideal way to encapsulate these pieces into efficient, portable units.

- Developers are increasingly shifting to agile methods and DevOps and leveraging continuous integration/continuous deployment systems. Containers, being lightweight and fast, enable fast software pipelines and automated testing to reduce manual release processes.

» **Develop cloud-native applications:**

- Most IT budget and resources today go to maintaining existing systems instead of new innovation. Microservices, containers, and other cloud-native technologies help enable customers to turn the focus to innovation and develop new forward-looking applications to stay competitive.

» **Modernize applications:**

- Containers can also be used for existing applications without refactoring. For enterprises today, this accounts for the majority of containerization activity. Containerizing existing applications enables the application to be more portable for migration to the public cloud and can port the application into newer developer workflows, software pipelines, and orchestration systems. IDC data shows that 58% of apps lifted and shifted into a container will undergo further refactoring over time.

» **Automate operations at scale:**

- Container orchestration systems are designed to deploy and manage distributed, cloud-native applications. These systems often take new approaches such as immutable infrastructure and have fully automated patterns for common scenarios such as blue/green upgrades and A/B testing. These systems are also designed to operate at cloud scale, offering highly reactive scalability and resiliency.

As enterprises begin to adopt containers at scale, container solutions need to expand from being merely an orchestration product to a full enterprise platform that spans multiple integrated areas. This capabilities expansion is very similar to how virtualization evolved, where the initial hypervisor product quickly evolved to virtualization management and then to other areas such as storage and networking. Containers are now appearing in every area of the datacenter and having an impact on every layer of the infrastructure stack including storage, networking, security, and monitoring/performance management. Unlike virtualization, containers also need to integrate with the developer stack, such as code repositories and software build systems, where containers are created and fed into the infrastructure.

> As enterprises begin to adopt containers at scale, container solutions need to expand from being merely an orchestration product to a full enterprise platform that spans multiple integrated areas.

Overview of Openshift On AWS

Red Hat OpenShift

Red Hat OpenShift Container Platform is a comprehensive, enterprise-ready container solution built around Kubernetes. It includes both infrastructure and operations tools as well as tools to enable a full developer experience. Red Hat OpenShift is built on the foundation of Red Hat Enterprise Linux and extends Kubernetes infrastructure in several ways:

» Advanced networking with multitenant SDN and a service mesh (based on Istio)

» Advanced management such as monitoring (Prometheus), logging, chargeback, and tracing

» Access to prebuilt container images (Red Hat Container Catalog), operators (templates for operating Kubernetes applications), and cloud service brokers

For developers, OpenShift also offers a full developer experience that includes automated container builds and CI/CD pipelines. OpenShift is fully pluggable and works with a wide range of technologies:

» Languages including .NET, Java, Node.js, PHP, Python, Ruby, and Perl

» Databases such as MariaDB, MongoDB, MySQL, PostgreSQL, and Redis

» Red Hat JBoss Middleware as cloud-based OpenShift services

OpenShift Dedicated is a single-tenant version of OpenShift managed by Red Hat on Amazon Web Services. OpenShift Dedicated features high-availability Kubernetes clusters and is backed by enterprise support. Customers deploying OpenShift Dedicated can leverage existing discounts and security profiles with AWS and self-service network configuration.

Amazon Web Services

Amazon Web Services is a pioneer and a leading provider of public cloud services. As one of the first and one of the largest public clouds, AWS has matured its technology over time, earning the trust of customers and operating with a large global reach and scale.

AWS' core infrastructure services provide the foundation for OpenShift deployed in AWS, making them an essential foundation that OpenShift runs on. These services are highly performant, scalable, reliable, secure, and available in many global locations. For compute, EC2 provides the VMs that run the Kubernetes control plane and the worker nodes. Storage is available in several different formats, S3 for object storage, EBS for block, and EFS for file, which are all available for containers to access.

OpenShift on AWS

By deploying OpenShift on AWS customers take advantage of the availability, scalability, security and cost of the AWS cloud. Customers deploying OpenShift on AWS can provision and manage native AWS services, as well as expose these services to applications from within the OpenShift environment through the use of the AWS Service Broker or AWS Service Operator. AWS Service Operator is part of OperatorHub which is an opensource toolkit offering a wide array of tools and utilities designed to manage Kubernetes native applications.

OpenShift integrations with Native AWS Services

By deploying OpenShift on AWS customers can expose other AWS services to their OpenShift environment using the AWS Service Broker and manage AWS Services from Kubernetes using the AWS Service Operator.

OpenShift Dedicated features high-availability Kubernetes clusters and is backed by enterprise support.

The Business Value of Openshift On AWS

Study Demographics

IDC conducted research that explored the benefits of developing and running applications using the Red Hat OpenShift platform in the AWS cloud. Research included interviews with eight organizations that are using OpenShift on AWS. Table 1 presents demographics for the organizations surveyed. The overall profile of organizations was that of a large enterprise with significant IT footprints as evidenced by the average number of employees across all organizations (44,325), development teams (2,257), and revenue ($10.98 billion). Interviewed organizations represented the experiences of various vertical industries, including the energy, financial services (2), healthcare, hospitality, legal services, pharmaceutical, and telecom sectors.

TABLE 1

Demographics of Interviewed Organizations

	Average	Median
Number of employees	44,325	17,500
Number of IT staff, non-developers	485	500
Number of developers, total	2,257	412
Revenue per year	$10.98 billion	$1.5 billion
Country	United States	
Industry	Energy, financial services (2), healthcare, hospitality, legal services, pharmaceutical, telecom	

n = 8
Source: IDC, 2019

Selection and Use of OpenShift on AWS

Study participants described reasons for choosing OpenShift on AWS as well as their use patterns in the context of their overall IT and business environments. Interviewed customers noted selection criteria that related specifically to functionalities of both the Red Hat OpenShift platform and the AWS cloud, as well as the combined Red Hat and AWS solution. Reasons cited by interviewed organizations for choosing OpenShift on AWS included the following: needing to optimize application development activities, installing a cost-effective and user-friendly platform for developing and running applications, gaining cloud-based flexibility and agility, having a platform that can fit in multicloud and hybrid cloud environments, and deepening use of containers.

"Our developers prefer a platform with ready-made integration, and OpenShift on AWS gives them this ease of use. For example, we have to distribute our application-related infrastructure to different zones so that they don't have to worry about something going awry in a zone and integration supports this."

Study participants shared specific observations about these benefits:

» **Using an integrated, user-friendly platform (energy):** *"Our developers prefer a platform with ready-made integration, and OpenShift on AWS gives them this ease of use. For example, we have to distribute our application-related infrastructure to different zones so that they don't have to worry about something going awry in a zone and integration supports this."*

» **Flexibility and simplicity of platform (financial services):** *"We're moving away from another cloud platform and wanted something more flexible. Our developers really like OpenShift on AWS because of containerization and the ease of deployment. The difference is like two different types of puzzles where one puzzle has 10 pieces and the other has thousands."*

» **Developing in multicloud environment (pharmaceutical):** *"We have a multicloud environment and OpenShift on AWS has features that make it easier to be agile in a multicloud environment such as allowing modules to be customized by department and priority."*

Table 2 provides specifics on how interviewed organizations were using OpenShift on AWS at the time of interviews. On average, core teams of 38 DevOps members carry out significant development work on the OpenShift on AWS platform, with an additional 325 developers on average working on the platform to some extent. Study participants described developing and running a specific subset of custom business-critical applications on the OpenShift on AWS platform, with an average of 26 applications used by more than 21,000 employees. Applications developed and run on the OpenShift for AWS platform include a proprietary loan platform, predictive risk applications, reservation systems, payment portals, accounts payable applications, and other customer-facing applications.

TABLE 2

Use of OpenShift on AWS by Interviewed Organizations		
	Average	**Median**
Business applications	26	28
Number of internal users of applications	21,480	6,400
Number of DevOps team members working on platform	38	35
Number of developers working on platform	325	50

n = 8
Source: IDC, 2019

The Business Value of OpenShift on AWS

Interviewed organizations have substantially changed how they develop and run business applications with the OpenShift on AWS platform. Generally, study participants moved to OpenShift on AWS from on-premise approaches that were neither sufficiently robust nor flexible to meet the needs of their business operations. With OpenShift on AWS, they can now better meet business demand by delivering new applications and features with greater frequency and with reduced staff time requirements, thereby increasing the productivity of DevOps teams working on the platform (see Figure 2). Further, they are optimizing operating costs related to IT staff time requirements as well as hardware and platform licensing costs. In total, IDC projects that interviewed organizations will achieve benefits worth an average of $10.89 million per year per organization ($288,600 per core DevOps team member working on OpenShift on AWS) over five years in the following areas:

» **Business productivity benefits:** Delivery of more functional and timely services and products results in higher revenue and increases in employee productivity levels. IDC projects that interviewed organizations will realize higher revenue and productivity worth an average of $5.15 million per organization per year ($136,600 per DevOps team member).

» **IT staff productivity benefits:** Development teams work more effectively to deliver value to their organizations, and IT infrastructure and security teams spend less time on baseline day-to-day activities. IDC puts the value of these IT staff productivity gains and efficiencies at an average of $3.11 million per organization per year ($82,400 per DevOps team member).

» **Risk mitigation — user productivity benefits:** Users of applications face fewer interruptions to work from unplanned outages and business benefits from improved continuity. IDC estimates that study participants will realize benefits in user productivity and revenue from reducing the frequency and impact of unplanned downtime worth an average of $1.96 million per organization per year ($52,100 per DevOps team member).

» **IT infrastructure cost reductions:** Study participants lower IT infrastructure costs associated with running on-premise environments and reduce licensing costs for legacy development platforms. IDC calculates that they will save an average of $0.66 million per organization per year ($17,600 per DevOps team member).

IDC projects that interviewed organizations will realize higher revenue and productivity worth an average of $5.15 million per organization per year ($136,600 per DevOps team member).

FIGURE 2

Average Annual Benefits per Organization

n = 8
Source: IDC, 2019

Agile and Effective Application Development

Interviewed organizations' development teams — especially DevOps teams — rely on continuous and timely access to compute, storage, and network resources. Otherwise, they cannot effectively carry out activities related to development such as preparation, coding, testing, and deployment. Without on-demand access to IT resources to execute these activities, their activities lose continuity and can create delays, potentially creating a ripple effect in terms of effectively serving their businesses and line-of-business users. Interviews with OpenShift on AWS customers show that the platform has helped them deliver IT compute and storage resources to their DevOps and developer teams much more effectively, thereby enabling development efforts.

Improvements in IT agility with OpenShift on AWS relate to the Red Hat OpenShift platform and the AWS cloud. Red Hat OpenShift provides an agile foundation for developing and/or running applications based on Kubernetes and container technologies. Further, the OpenShift Service Catalog enables automated extensions without requiring staff intervention. Running OpenShift in the AWS cloud enables organizations to leverage the fundamental agility of public cloud and access AWS templates and best practices to automate delivery of infrastructure to build out their environments.

Overall, study participants reported substantial gains in agility in terms of deploying compute and storage with OpenShift on AWS. It has reduced the total time required to deploy both new compute (64% faster) and storage (72% faster), which has also reduced staff time required to carry out deployment requests (71% less for compute and 74% less for storage, respectively) (see Figure 3).

FIGURE 3

Impact on IT Agility

(Number of days/hours)

	Time to deploy new compute (days)	Staff time to deploy new compute (hours)	Time to deploy new storage (days)	Staff time to deploy new storage (hours)
Before/without OpenShift on AWS	2.2	4.0	0.9	3.3
With OpenShift on AWS	0.8	1.2	0.3	0.9
	64% faster	71% less	72% faster	74% less

■ Before/without OpenShift on AWS   ■ With OpenShift on AWS
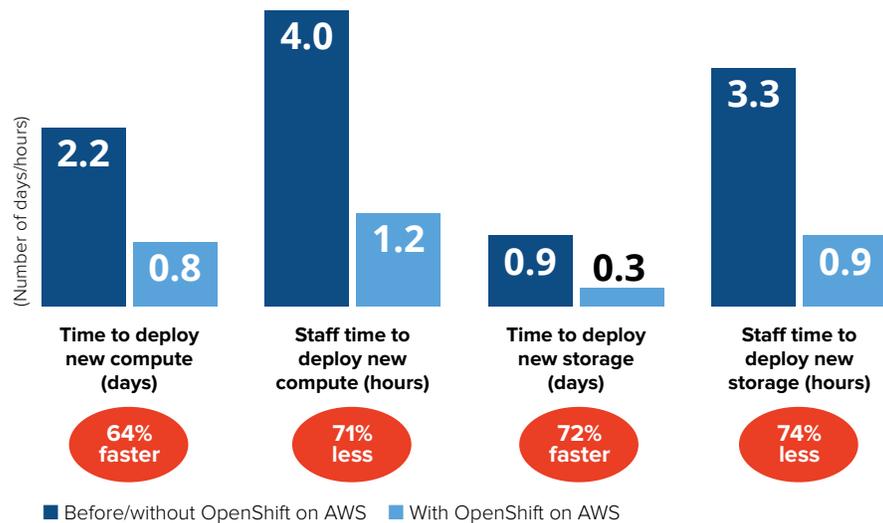
n = 8
Source: IDC 2019

> "OpenShift on AWS is really easy for building and scaling applications. Our developers say that OpenShift on AWS is very easy to use and they are definitely more productive as a result."

Study participants discussed how they have leveraged improved agility and enhanced platform functionality to enable their DevOps teams and broader development activities. With OpenShift on AWS, study participants are delivering new applications and new features with greater frequency for both business units and customers. Study participants described the impact in more detail:

» **Platform ease of use and continuity for development activities (financial services):** *"OpenShift on AWS is really easy for building and scaling applications. Our developers say that OpenShift on AWS is very easy to use and they are definitely more productive as a result."*

» **More efficient platform, faster deployment (healthcare):** *"OpenShift on AWS allows our developers to concentrate more directly on what they are doing rather than putting out six fires at once. It allows for a more holistic application architecture … We've gone from needing two months to deploy a new application to only needing one month with OpenShift on AWS."*

"OpenShift on AWS has shortened development times and given us the ability to be agile … To put out a new feature, including the design and development, used to take us around 10 weeks and we now need about 4 weeks with OpenShift on AWS."

» **Reduced development life cycles and staff time requirements (hospitality):**
"OpenShift on AWS has shortened development times and given us the ability to be agile … To put out a new feature, including the design and development, used to take us around 10 weeks and we now need about 4 weeks with OpenShift on AWS."

Table 3 provides metrics on these improvements in the delivery of new applications and features. With the OpenShift on AWS platform, DevOps and development teams have more than doubled the number of new applications and features they deliver to their businesses — 112% and 148% increases, respectively. Meanwhile, they have tightened timelines for delivering to their businesses. They have reduced development life cycles by an average of 49% for new applications and 56% for new features, allowing them to support line-of-business teams and customers in a much more timely fashion. For study participants, this means that their development activities can better track business demand. They have the agility and flexibility to take on new projects as needed and can meet actual business needs through more timely delivery of new functionality.

TABLE 3

Application Development KPIs

	Before OpenShift on AWS	With OpenShift on AWS	Increased Value with OpenShift on AWS	Percentage Benefit with OpenShift on AWS
Number of new applications/features developed				
Number of new applications per year	7	14.9	7.9	112
Number of new features per year	55	136.5	81.5	148
Development life cycle (weeks)				
New applications	29.2	15	14.2	49
New features	7.8	3.5	4.3	56
Staff time per new application/feature (FTEs)				
New applications	5.9	3.2	2.7	47
New features	0.7	0.3	0.4	57

n = 8
Source: IDC, 2019

"We are definitely seeing faster development cycles with OpenShift on AWS and improved business continuity. From a development perspective, back-end planning and processes have been reduced tremendously because the tools are amazing. All of our developers are gaining in productivity as a result. We've seen about a 17% increase in developer productivity levels."

As a result of these improvements, customers interviewed reported substantially higher developer productivity. One study participant working in the legal services industry spoke about how faster development life cycles ties to higher developer productivity: *"We are definitely seeing faster development cycles with OpenShift on AWS and improved business continuity. From a development perspective, back-end planning and processes have been reduced tremendously because the tools are amazing. All of our developers are gaining in productivity as a result. We've seen about a 17% increase in developer productivity levels."* These benefits are further quantified in Figure 4, which shows 24% higher developer productivity after deployment of OpenShift on AWS. For study participants, this means that their DevOps and other development teams working on the OpenShift on AWS platform deliver much more value to their organizations, an important gain as development activities continue to become more central to the success of many organizations.

FIGURE 4

Impact on Application Developer Productivity

36.7

24% higher productivity with OpenShift on AWS

45.4

Previous environment   **With OpenShift on AWS**

(Equivalent productivity)
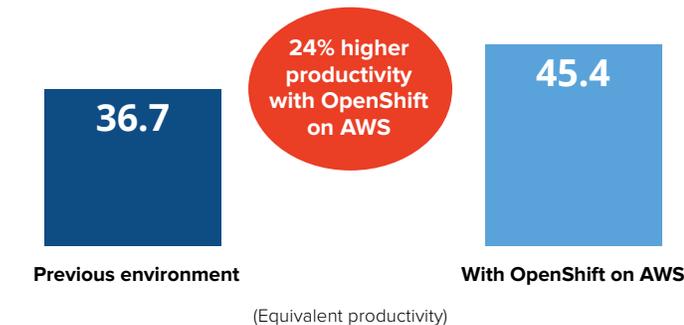
n = 8
Source: IDC 2019

Business and Operational Enablement

By enabling development activities on the OpenShift for AWS platform, study participants can better meet business demand by delivering higher quality and more timely new applications and features.

In a virtuous cycle, they convert having a better application development platform and advanced functionality into the development of better products and services while moving those offerings to market more quickly and better responding to shifting customer demand. Ultimately, the result of establishing more effective and efficient development activities is increased revenue because they can address potential business opportunities and differentiate their services by bringing them to market faster. Study participants provided examples of business impact:

> When we bid for a contract, we can quote a 30-day delivery window with OpenShift on AWS, where it used to be 45 days. That means more revenue — around 5% of $140 million because of OpenShift on AWS."

» **Faster to respond to customer demand (legal services):** *"When we bid for a contract, we can quote a 30-day delivery window with OpenShift on AWS, where it used to be 45 days. That means more revenue — around 5% of $140 million because of OpenShift on AWS."*

» **Having the ability to deploy locally (energy):** *"When we roll out global applications, having agility with OpenShift on AWS to deploy locally is key because we often have to abide by local rules. This means that having localized setups where we can accommodate infrastructure changes quickly is important to our business."*

» **Faster to market (financial services):** *"OpenShift on AWS helps us win new business because we're getting to market faster with new applications and services, so we don't lose as many opportunities. At this point, this is worth $100,000–200,000 in additional revenue per year."*

» **More robust core functionality (hospitality)**: *"OpenShift on AWS has really helped us improve our reservation system and contributed to up to 15% more revenue, worth tens of millions of dollars per year."*

Table 4 quantifies the impact to interviewed organizations of increasing revenue with the OpenShift on AWS platform. As shown, IDC calculates that they will realize almost $33 million per organization in higher revenue per year attributable to OpenShift on AWS ($871,300 per DevOps team member).

TABLE 4

Business Productivity Benefits: Increased Revenue		
Revenue impact, better addressing business opportunities	**Per Organization**	**Per DevOps Team Member**
Additional revenue per year	$32.87M	$871,300
Recognized revenue per year — IDC model*	$4.93M	$130,700

n = 8
*The IDC model assumes a 15% operating margin for all additional revenue.
Source: IDC, 2019

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> "Using OpenShift on AWS in a multicloud environment is beneficial, for example, when our R&D team does clinical trials. They can be conducted in less time because OpenShift is on the cloud. It's faster for senior managers and decision makers to share files."

Study participants also described how OpenShift on AWS has enabled operational efficiencies in the form of increased productivity for line-of-business users. The enablement of self-service functionality is a key driver of operational efficiencies; self-service increases the flexibility and agility of teams that need dynamic access to IT resources and leaves them less depending on IT teams. One study participant, working in the pharmaceutical industry, discussed how the platform enabled more efficient R&D operations: *"Using OpenShift on AWS in a multicloud environment is beneficial, for example, when our R&D team does clinical trials. They can be conducted in less time because OpenShift is on the cloud. It's faster for senior managers and decision makers to share files."*

These operational gains are quantified in Table 5, which addresses increased user productivity and the automated self-service benefits of OpenShift on AWS. As shown, the time required for service requests to be handled, measured in days, was reduced from 2.4 days to 1.3 days, representing a 45% improvement. This translates to less productive time lost per organization per year in terms of employees waiting for fulfillment of service requests, with study participants losing 45% less productive time on average related to service requests.

TABLE 5

Business Benefits: Increased User Productivity, Self-Service

	Before OpenShift on AWS	With OpenShift on AWS	Increased Value with OpenShift on AWS	Percentage Benefit with OpenShift on AWS
Number of service requests per year	1,868	1,403	466.0	25
Time to handle per service request (days)	2.4	1.3	1.1	45
Staff time to handle per service request (hours)	13.4	7.4	6.0	45
FTE time required to handle service requests per year per organization	21.2	12.0	9.2	43
Number of users impacted per service request	23.1	14.4	8.7	38
Productive time lost per organization per year, service fulfillment	9.3	5.9	3.4	36

n = 8
Source: IDC, 2019

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"Applications running on OpenShift on AWS are really easy to troubleshoot when there are problems. They are also easy to deploy and to carry out failovers as needed."

Reducing Operational Risk

Study participants have also reduced the operational risk associated with unplanned outages with the OpenShift on AWS platform. In particular, they reported leveraging functionality enabled by OpenShift on AWS such as automated failover to reduce the frequency of unplanned outages. As one study participant working in the financial services sector commented: *"Applications running on OpenShift on AWS are really easy to troubleshoot when there are problems. They are also easy to deploy and to carry out failovers as needed."* Study participants have also benefited from having a more robust platform based on Kubernetes technology and the reliability and agility of the AWS cloud. As a result of both substantially fewer unplanned outages (61%) and faster resolution of outages (46%), employees lost much less productive time because of unplanned outages (as shown in Table 6, going from 3.1 hours to 0.6 hours of lost productivity per user, representing an 80% improvement).

TABLE 6

Impact on Unplanned Downtime				
	Before OpenShift on AWS	**With OpenShift on AWS**	**Difference**	**Percentage Change**
Unplanned outages per year per organization	12.7	5	7.7	61
MTTR (hours)	6.7	3.6	3.1	46
Hours per user of lost productivity per year	3.1	0.6	2.5	80
FTE impact, lost user productivity per year	34.9	6.8	28.1	80

n = 8
Source: IDC, 2019

Providing a Cost-Effective Development and IT Platform

Organizations benefit when they can invest in establishing and training highly skilled development teams that deliver new functionalities tailored to business needs. Given budget limitations, they often must make choices in direct investment between staff and infrastructure — including hardware and software — to support development activities. Interviewed organizations reported that moving to the OpenShift on AWS platform has enabled hardware and platform savings that have allowed them to optimize the ratio of their investment in development staff compared with hardware/software. As shown in Figure 5, they have shifted an average of 10% of their investment in the direction of staffing development, even as they have realized substantial productivity gains for their development teams that further enhance their value to their organizations.

"In terms of running applications, OpenShift on AWS allows us to streamline on one standard instead of having different standards for different platforms. Now, we have a team of three to four who do infrastructure-related work in about half the time, compared with 70% previously. Also, we're avoiding one to two staff hires."

FIGURE 5

Application Development–Related Cost Structure

($ per organization over five years)

■ Cost of platform (hardware, software) ■ Cost of development staff time

n = 8
Source: IDC 2019
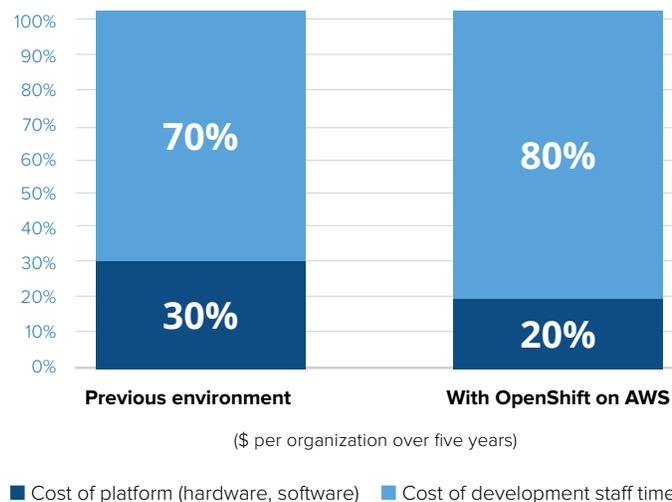
Study participants also reported that OpenShift on AWS is delivering further efficiencies across teams responsible for running IT operations on a daily basis. They described how OpenShift on AWS helps them reduce the operational burden on IT infrastructure and security teams because they must spend less time carrying out these activities on a day-to-day basis. In particular, these teams must spend less time on day-to-day activities such as monitoring, patching, and applying updates with containerization and automation underlying the OpenShift on AWS platform. In turn, these efficiencies free up staff time to take on other activities and initiatives more directly supportive of business goals. Study participants described these benefits for these IT teams:

» **The benefit of having one standard (healthcare):** *"In terms of running applications, OpenShift on AWS allows us to streamline on one standard instead of having different standards for different platforms. Now, we have a team of three to four who do infrastructure-related work in about half the time, compared with 70% previously. Also, we're avoiding one to two staff hires."*

» **Freeing up staff time for research (hospitality):** *"OpenShift on AWS is allowing us to free up IT time to do things like research and exploratory work that we did not do before. Also we've been able to better support new applications even as our team carries out their daily activities."*

"OpenShift on AWS is allowing us to free up IT time to do things like research and exploratory work that we did not do before. Also we've been able to better support new applications even as our team carries out their daily activities."

Table 7 provides IDC's calculations on staff impacts and benefits for these IT teams. With the OpenShift on AWS platform, these organizations are capturing strong efficiencies for IT infrastructure (49%), help desk (35%), and IT security (35%) teams.

TABLE 7

Impact on IT Staff

FTEs per Organization for Equivalent Workloads	Before OpenShift on AWS	With OpenShift on AWS	Difference	Percentage Change
IT infrastructure management	21.2	10.8	10.4	49
IT security	6.4	4.2	2.2	35
Help desk	2.3	1.3	1	45

n = 8
Source: IDC, 2019

Study participants reported other cost savings related to their development platforms and IT infrastructure costs through their use of the OpenShift on AWS platform. These benefits related to factors such as the overall cost-effectiveness of the OpenShift platform, the elasticity of a cloud-based approach, and the ability to avoid the cost of refreshing and building out equivalent but less efficient on-premise environments.

Study participants described these benefits:

» **Greater elasticity and flexibility (financial services):** *"OpenShift on AWS has made us more elastic because we don't need to procure equipment and don't have to wait through long procurement processes. We don't need to create growth plans, and we can always easily spin up new servers in the cloud."*

» **Lower cost for higher functionality (legal services):** *"We were using another application development platform that we've replaced. It cost about twice as much as OpenShift on AWS when annualized."*

"We were using another application development platform that we've replaced. It cost about twice as much as OpenShift on AWS when annualized."

Overall, study participants are leveraging OpenShift on AWS as a cost-effective platform for developing and running key workloads. As shown in Figure 6, IDC calculates that interviewed organizations will deploy and run OpenShift on AWS at a 54% lower cost over five years compared with refreshing their legacy environments in three areas:

» The cost of OpenShift on AWS versus alternative approaches (19% lower on average)

» The cost of IT staff time for management and support (46% lower on average in terms of IT infrastructure, helpdesk, and IT security teams)

» The cost of lost productivity and unplanned downtime (80% lower)

FIGURE 6

Five-Year IT Infrastructure Costs
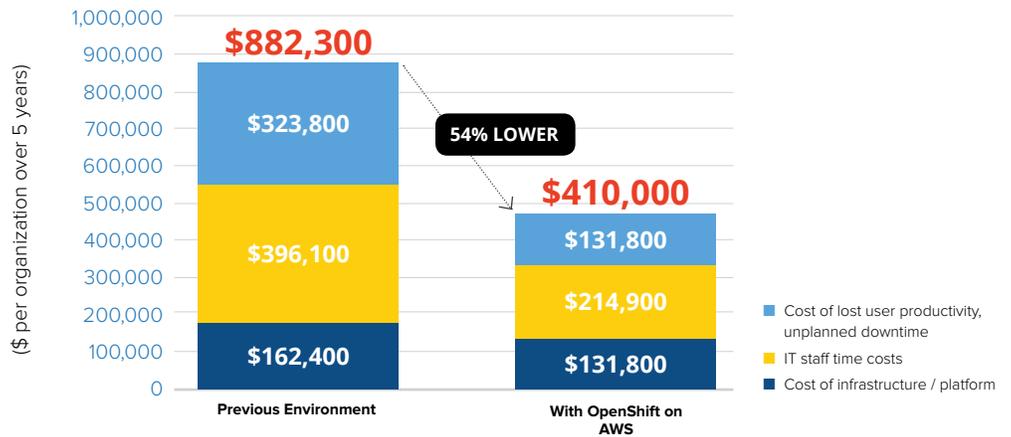
n = 8
Source: IDC, 2019

ROI Analysis

Table 8 presents IDC's analysis of the benefits and costs related to surveyed organizations' use of OpenShift on AWS. IDC projects that after making a discounted investment of $5.09 million per organization ($0.13 million per DevOps team member), these organizations will realize discounted benefits worth $38.72 million per organization over five years in terms of higher developer and user productivity, revenue gains, and cost reductions ($1.03 million per DevOps team member).

IDC estimates that the organizations will achieve an average ROI of 661% and a breakeven on their investment in five months.

TABLE 8

ROI Analysis

	Five-Year Average Organization	Five-Year Average per DevOps Team Member
Benefit (discounted)	$38.72 million	$1.03 million
Investment (discounted)	$5.09 million	$0.13 million
Net present value (NPV)	$33.63 million	$0.89 million
Return on investment (ROI)	661%	661%
Payback period	5 months	5 months
Discount rate	12%	12%

n = 8
Source: IDC, 2019

Challenges and Opportunities

Challenges

Containers aren't a magical solution to workload portability. While the container stack is much more standardized than with VMs, many other issues can impede portability. If the code within the container is tied to a particular cloud service or cloud API, then the container is still only as portable as those dependencies. Containers also don't address data gravity, another factor in portability. While containers definitely improve portability, they don't fully solve it.

Containers and public cloud are technologies that are still new to enterprises. Public cloud is more mature and adopted, but many are still in the planning stages or have very small footprints. Containers are very cutting edge to all but the progressive cloud-native early adopters, and there is a significant lack of enterprise expertise in building cloud-native and microservices applications. There is going to be a lot of research, experimentation, and learning from enterprises in the coming years in order to adopt containers on the public cloud. Providers such as Red Hat and Amazon can provide technology, but skills, processes, and people are much slower to change.

Opportunities

Enterprises looking to adopt containers need trusted providers and certified, supported solutions. Red Hat is a trusted enterprise provider of open source software and Amazon is a leader in the public cloud. Combining Red Hat's open source container software with the reach and scale of Amazon's cloud combines robust infrastructure with a modern container environment. Users can deploy OpenShift faster to get all the benefits of containers without having to manage the underlying infrastructure.

Conclusion

Containers and cloud are both spurring digital transformation and innovation in customers. While individually the technologies have compelling benefits, combining the two brings great synergy. Containers bring a lightweight computing package that has enabled more agile orchestration and microservices. Platforms like OpenShift bring together numerous container open source technologies into a comprehensive, integrated, and supported platform for enterprises. However, containers still need to run on real infrastructure and running OpenShift on a public cloud like AWS lets containers take advantage of modern, on-demand, robust cloud infrastructure and access the global reach of the AWS cloud. In addition, it also enables container application developers to access a myriad of application and data services for their applications. Together, container platforms and cloud computing are enabling customers to automate operations, increase resiliency and scalability, modernize applications, and create innovative new applications.

Appendix: Methodology

IDC's standard ROI methodology was utilized for this project. This methodology is based on gathering data from organizations currently using OpenShift on AWS as the foundation for the model. Based on interviews with these study participants, IDC performs a three-step process to calculate the ROI and payback period:

» Measure the benefits associated with using OpenShift on AWS in terms of infrastructure-related cost savings, IT staff efficiency and productivity benefits, higher user productivity, and increased revenue.

» Ascertain the investment made in deploying and using OpenShift on AWS.

» Project the costs and benefits over a five-year period and calculate the ROI and payback for OpenShift on AWS.

IDC bases the payback period and ROI calculations on a number of assumptions, which are summarized as follows:

» Time values are multiplied by burdened salary (salary + 28% for benefits and overhead) to quantify efficiency and manager productivity savings. For purposes of this analysis, IDC has used standard business value assumptions of an average fully loaded salary of $100,000 per year for IT staff members and an average fully loaded salary of $70,000 for non-IT staff members. IDC assumes that employees work 1,880 hours per year (47 weeks x 40 hours).

» Downtime values are a product of the number of hours of downtime multiplied by the number of users affected.

» The impact of unplanned downtime is quantified in terms of impaired end-user productivity and lost revenue.

» Lost productivity is a product of downtime multiplied by burdened salary.

» The net present value of the five-year savings is calculated by subtracting the amount that would have been realized by investing the original sum in an instrument yielding a 12% return to allow for the missed opportunity cost. This accounts for both the assumed cost of money and the assumed rate of return.

» Because every hour of downtime does not equate to a lost hour of productivity or revenue generation, IDC attributes only a fraction of the result to savings. As part of our assessment, we asked each company what fraction of downtime hours to use in calculating productivity savings and the reduction in lost revenue. IDC then taxes the revenue at that rate.

» Further, because IT solutions require a deployment period, the full benefits of use of OpenShift on AWS are not available during deployment. To capture this reality, IDC prorates the benefits on a monthly basis and then subtracts the deployment time from the first-year savings.

Note: All numbers in this document may not be exact due to rounding.

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