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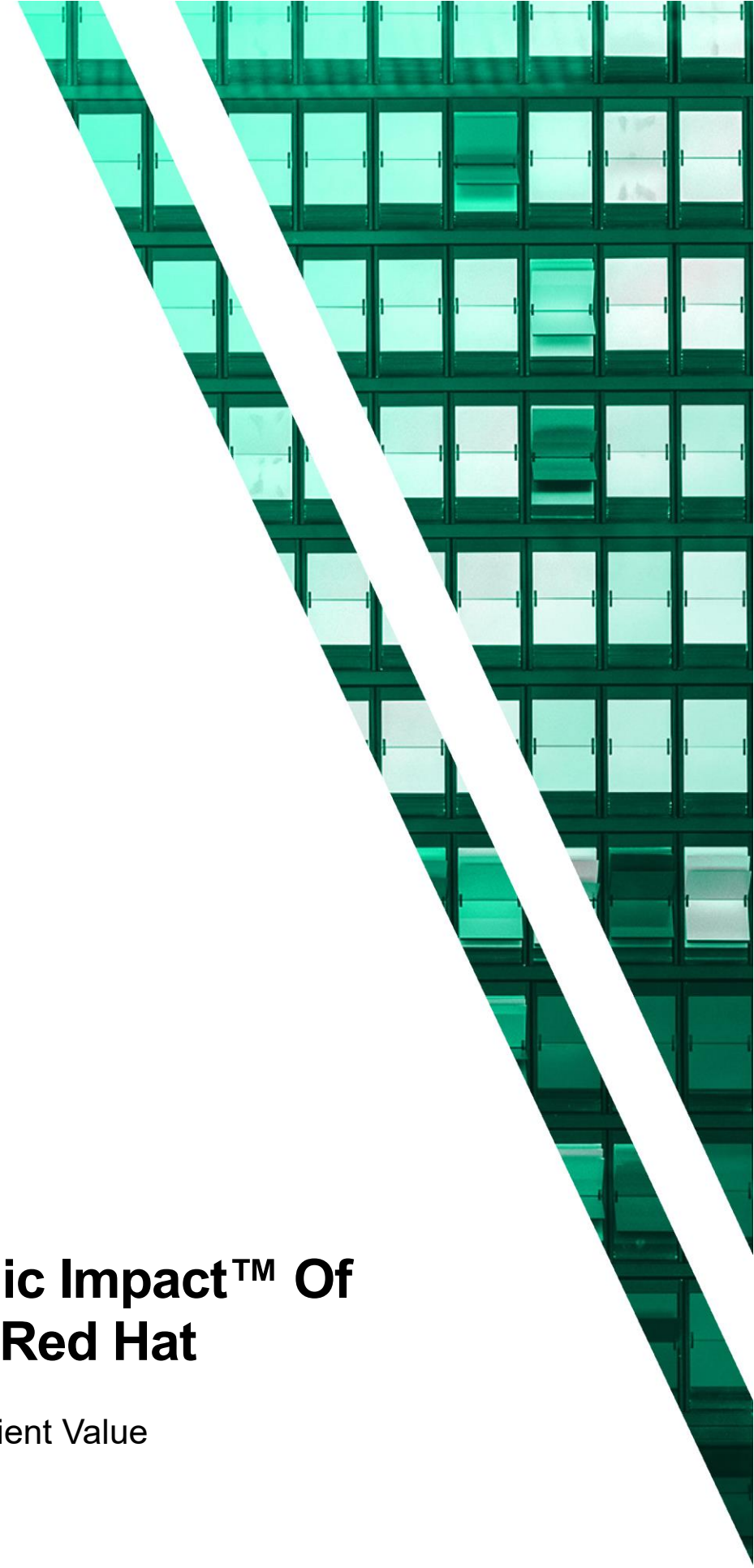

The Total Economic Impact™ Of IBM Services and Red Hat

Partnering for Accelerated Client Value

NOVEMBER 2020

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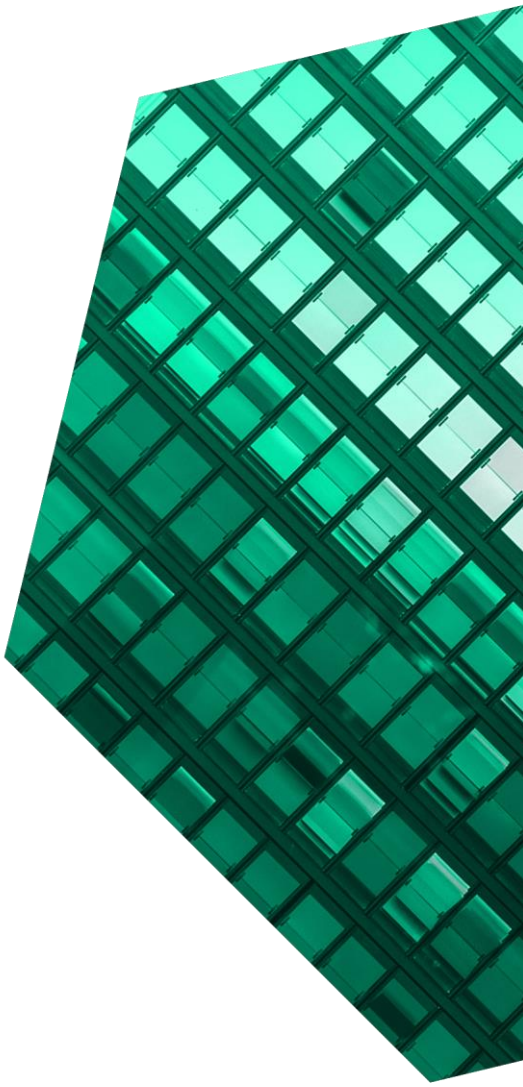
Project Team: *Sam Conway, Senior Consultant*
Sam Sexton, Associate Consultant



Executive Summary

Organizations are investing in modernization efforts to transform the applications and infrastructure underpinning their core business activities and workflows. IBM Services offers specialized services for organizations currently using or considering Red Hat to modernize and containerize their legacy applications — avoiding internal costs and accelerating the time-to-value of open source multicloud environments.

Forrester's research states that enterprises must expand and modernize their application portfolios to win, serve, and retain customers.[1] The challenge for firms is monumental: They require easy access to new technologies and tools, speedy application delivery, and flexible economics, and most of them increasingly rely on public cloud platforms to meet these needs.[2] However, while application development leaders want to modernize using cloud technologies and practices, they are frequently hindered. Organizations are reluctant to undertake long and expensive transformation journeys and finding the starting point for modernization can be difficult. Furthermore, modernization requires adding new talent or reskilling, selecting new cloud platforms, and adopting new cloud-native application delivery practices.[3]

Due to the overwhelming challenges of modernization at scale — and the possibility of costly missteps — organizations frequently partner with expert practitioners that can help guide their firms through demanding transitions in a timely and cost-effective manner. IBM Services provides the people, processes, and technology for organizations to execute on their open source multicloud strategy while avoiding typical development costs and accelerating time-to-market. By containerizing and modernizing legacy applications with Red Hat OpenShift, organizations can reduce infrastructure footprints, lower maintenance costs, and achieve app and workload portability across a wider range of cloud infrastructure and platform services.[4]

KEY STATISTICS

Return on investment (ROI)
159%

Payback Period
8 months

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

To better understand the benefits, costs, and risks associated with this investment, Forrester interviewed an organization with experience using Red Hat OpenShift and working with IBM Services. Forrester used this experience to project a three-year financial analysis.

Prior to engaging with IBM Services, the customer started developing its own proprietary continuous delivery platform based on Red Hat OpenShift.

However, the organization realized that in order to scale and accelerate their transformation, it would need to partner with an outside expert or invest heavily in securing top development talent.

After partnering with IBM, the customer accelerated its software delivery times by 300% and expedited its time-to-value on the new platform by 24 weeks, all while avoiding 40% of additional developer head count.

> **"We're doing things faster and with fewer people."**
>
> *CTO, financial services*

KEY FINDINGS

Quantified benefits. Risk-adjusted present value (PV) quantified benefits include:

- **Accelerated time-to-value of OpenShift platform by 24 weeks.** The organization recognized significant value from its OpenShift platform: 30% reduction in outages, 20% reduction in application fixes, and 66% savings in security architecture spend. Partnering with IBM development teams specializing in OpenShift allowed the organization to accelerate its path to production and recognize the benefits of its platform faster.
- **Avoided 40% in additional development head count.** The organization relied on expert practitioners from IBM for a significant portion of its microservices-based development activities. By working with IBM, the organization completed delivery with scrum teams of six developers instead of 10.
- **Improved development speed by three times.** Leveraging IBM's expertise in developing apps on OpenShift accelerated software delivery time. This freed up development teams to work on other application modernization efforts.

Unquantified benefits. Benefits that are not quantified for this study include:

- **Reduced hardware footprint.** The organization modernized applications and containerized microservices to a cloud platform, allowing it to retire legacy on-premises infrastructure.
- **Enabled new business capabilities and revenue streams.** With a continuous delivery platform and containerized microservices, the organization was able to develop flexible, future-proofed applications to better serve its internal and external customers.
- **Improved organizational agility.** With the ability to quickly develop and deliver new applications, the organization could react faster to events like disruptions and changing customer behavior due to the COVID-19 pandemic.

Costs. Risk-adjusted PV costs include:

- **IBM consulting fees totaling $16 million.** The organization pays for time and materials related to development and delivery.
- **Project management and coordination labor totaling $283,000.** Leaders and cross-functional employees take part throughout projects to drive the best-possible results.

The interview and financial analysis found that this customer experiences benefits of $41,188,678 over three years versus costs of $15,881,559, adding up to a net present value (NPV) of $25,307,119 and an ROI of 159%.

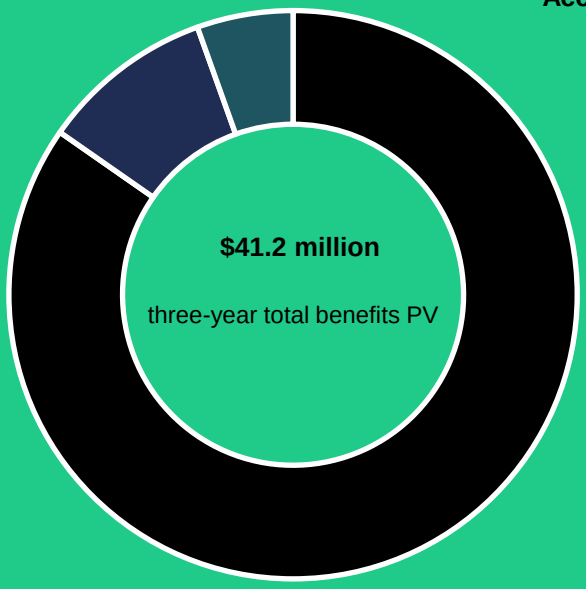
> **We use IBM Services for application development, and we use them for both OpenShift development and deployment. [IBM Services] has been an early adopter of our OpenShift environment...This is really about us leveraging its app dev capabilities because [IBM Services] understands OpenShift, and we can get things to market more quickly.**
>
> — CTO, financial services

Accelerated delivery → **300%**

Avoided head count → **40%**

Return on investment → **159%**

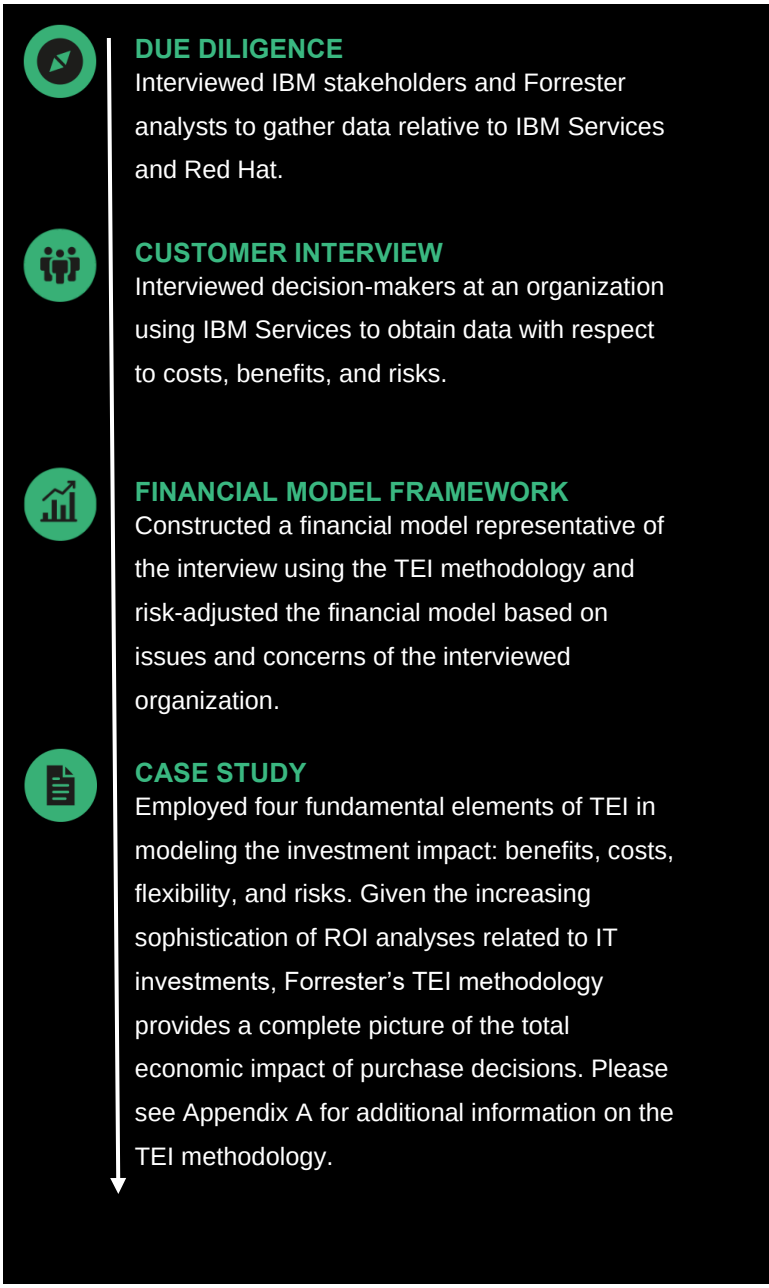
Payback period → **8 months**



TEI FRAMEWORK AND METHODOLOGY

From the information provided in the interview, Forrester constructed a Total Economic Impact™ framework for those organizations considering a partnership with IBM.

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 IBM Services can have on an organization.



The IBM Services Customer Journey

Drivers leading to the IBM Services investment

INTERVIEWED ORGANIZATION

Forrester interviewed an IBM Services customer with the following characteristics:

- The organization is a Fortune 500 financial services firm in the United States.
- The organization has over $100 billion in assets under management, and it serves over 10 million customers across the United States.
- The organization maintains a portfolio of over 1,000 applications in need of modernization.
- Prior to engaging with IBM Services for development and delivery of applications, the organization internally developed its own continuous delivery platform based on OpenShift.

CUSTOMER JOURNEY

As a financial services firm in operation for almost 100 years, the organization found itself mired in technical debt and outdated systems, and it had no way to effectively scale software development processes and update its portfolio of over 1,000 applications. Due to its industry, size, and conservative stance on regulatory compliance and security, the organization decided to develop its own cloud and development platforms to meet its growing technology needs.

DEVELOPING ITS OWN CLOUD PLATFORM

The organization first took stock of its IT environment, as well as what other organizations were doing. The CTO explained, “We looked at the landscape four years ago, and we knew that we were not keeping up with these lighter weight environments.” However, while decisionmakers understood the organization’s technology stack was dated and not up to snuff, the rigidity of a corporation of its size in a heavily regulated industry limited investment options. Similarly, the organization did not want to simply copy its existing code from one platform to another instead of addressing underlying dependency issues. The CTO detailed, “In our environment, an all-in bet on public cloud was not a viable option.” Ultimately, the firm decided to develop its own cloud development platform, allowing it to recognize the economies and agility of the cloud while utilizing existing intellectual property it had developed for its unique workflows.

PARTNERING WITH RED HAT

The organization explored the best methods to modernize its legacy application portfolio and which company to work with before ultimately selecting Red Hat. The CTO stated: “It became very apparent that the containerized approach was best. There were a lot of technologies and players, but we had a strong relationship with Red Hat with about 90% of our x86 environment virtualized on Red Hat. We took this relationship to the next level by going with OpenShift because it gave us a lot of things we would have to go build historically that we didn’t want to have to build again in the future.”

> **“We are building a next-gen, on-prem cloud platform from a software standpoint. That’s our Red Hat OpenShift environment.”**
>
> *CTO, financial services*

ACCELERATING VALUE WITH IBM SERVICES

After working with Red Hat to develop its new platform, the organization realized it did not have the internal talent required to modernize and develop applications at scale on its OpenShift platform. Recruitment and training were prohibitively expensive, and the organization wished to accelerate the time-to-value from its new platform.

The organization evaluated bringing in a services firm to augment its existing developer resources before ultimately deciding on IBM. A key differentiator for IBM was its long-standing partnership with Red Hat and its unique understanding of development and delivery processes for Red Hat products. IBM has three key factors to bring the customer's project to fruition:

- **People.** IBM has readily available top talent to execute development tasks.
- **Processes.** IBM brings the Garage method and cross-function agile teams to de-risk projects and accelerate time-to-value.
- **Technology.** IBM teams are backed by AI-driven accelerators that can swiftly refactor millions of lines of code into microservices.

> **"We are working with IBM around service enablement and building applications that run in this environment. We've had IBM focused on the platform. The team has done an amazing job, and that's because of the strong partnership with Red Hat."**
>
> — CTO, financial services

Analysis Of Benefits

Quantified benefit data

Total Benefits						
Ref.	**Benefit**	**Year 1**	**Year 2**	**Year 3**	**Total**	**Present Value**
Atr	Application engineering savings	$6,885,000	$13,770,000	$22,950,000	$43,605,000	$34,881,931
Btr	Improved development speed	$842,400	$1,684,800	$2,527,200	$5,054,400	$4,056,938
Ctr	Accelerated time-to-value of OpenShift platform	$467,160	$934,320	$1,401,480	$2,802,960	$2,249,809
	Total benefits (risk-adjusted)	$8,194,560	$16,389,120	$26,878,680	$51,462,360	$41,188,678

APPLICATION ENGINEERING SAVINGS

Evidence and data. The organization worked with IBM to modernize and develop applications and microservices for its OpenShift platform. IBM's partnership with Red Hat meant it could readily provide resources specializing in OpenShift-based application development and help the organization avoid hiring or training additional developers.

- The organization staffed its development scrum teams with an average of six FTEs. The CTO said these scrum teams would be an average of 10 head count if it had not worked with IBM.

Modeling and assumptions. The organization saves four head count per scrum team working in the OpenShift development environment, and the number of scrum teams working on the platform expands as more applications are modernized. In modeling this benefit, Forrester assumed an average fully burdened salary of $135,000. Individual scrum team member rates may vary based on position, seniority, and location.

Risks. The impact of IBM Services on investment returns will vary given an organization's size, scope, and development needs. The location of the organization may impact prevailing labor rates, causing variation in returns.

Synopsis. To account for these risks, Forrester adjusted this benefit downward by 15%, yielding a three-year, risk-adjusted total PV (discounted at 10%) of $35 million.

> **"I now see agile teams of six instead of 10. We see labor cost savings because we've made these things more manageable."**
>
> *CTO, financial services*

> **"Some ISVs sell you something and walk away: 'Here's the product. On to the next sale.' That has never been the culture with IBM or Red Hat. They know how strategic this partnership is, and they made it a really strong working relationship."**
>
> *CTO, financial services*

Application Engineering Savings					
Ref.	**Metric**	**Calculation**	**Year 1**	**Year 2**	**Year 3**
A1	Scrum teams working on service development	Interview	15	30	50
A2	Developers saved per team using OpenShift	Interview	4	4	4
A3	Average fully burdened salary	Assumption	$135,000	$135,000	$135,000
At	Application engineering savings	A1*A2*A3	$8,100,000	$16,200,000	$27,000,000
	Risk adjustment	↓15%			
Atr	Application engineering savings (risk-adjusted)		$6,885,000	$13,770,000	$22,950,000
	Three-year total: $43,605,000			**Three-year present value: $34,881,931**	

IMPROVED DEVELOPMENT SPEED

Evidence and data. IBM's unique specialization in OpenShift development helped the organization reduce development time and accelerate delivery of both simple and complex applications.

- The organization has containerized and migrated 600 applications and services to its platform. While some applications were migrated as is, others were refactored by extracting useful functionality from legacy applications and packaging them as microservices. The CTO stated, "We're divesting some of the custom-built pieces of core functions and decomposing the individual experiences into more fine-grained services. I might take what was a credit card application and break it into seven unique and reusable services."
- Working with IBM's development teams has greatly improved the time-to-market for services developed and deployed on OpenShift. The CTO explained: "We did a particular application for the bank, end-to-end from point of need to the point of production and deployment all in 12 weeks. Historically it would have taken us three times that."
- By accelerating development speed, the organization can recognize additional value from its existing workforce and redeploy saved hours to other transformational activities.

> **"It's not like I took my low-hanging fruit and decided that's what we'd put on the platform. We had super high volume, simple applications, as well as highly complex and larger multiservice-based applications."**
>
> *CTO, financial services*

Modeling and assumptions. Forrester modeled the benefit of improved development speed based on the following assumptions:

- The total number of applications and services on the platform is 600 by Year 3, with the organization incrementally increasing the annual amount developed for the platform with wider organizational adoption.
- The organization saves an average of 24 weeks in development time per application or service

and 15% of the saved time is directly attributed to IBM.

- The fully burdened developer salary is $135,000.

Risks. Forrester recognizes that these savings can vary from organization to organization based on factors such as historical development times, organizational agility, location, and scale.

Synopsis. To account for these risks, Forrester adjusted this benefit downward by 10%, yielding a three-year, risk-adjusted total PV of $4 million.

"When we have an issue in OpenShift, our time to recover service is 20% faster. This has a material impact on how we impact our customers."

CTO, financial services

Improved Development Speed

Ref.	Metric	Calculation	Year 1	Year 2	Year 3
B1	Annual applications/services developed for platform	Interview	100	200	300
B2	Normal development time (hours)	Interview	1,440	1,440	1,440
B3	Average development time with IBM (hours)	Interview	480	480	480
B4	Development hours redeployed to other transformational activities	B1*(B2-B3)	96,000	192,000	288,000
B5	Developer hour value (rounded)	$135,000/2,080	$65	$65	$65
B6	Percent attributed to IBM	Assumption	15%	15%	15%
Bt	Improved development speed	B4*B5*B6	$936,000	$1,872,000	$2,808,000
	Risk adjustment	↓10%			
Btr	Improved development speed (risk-adjusted)		$842,400	$1,684,800	$2,527,200
	Three-year total: $5,054,400			**Three-year present value: $4,056,938**	

ACCELERATED TIME-TO-VALUE FOR THE OPENSHIFT PLATFORM

Evidence and data. The new OpenShift platform provided a wide array of benefits: It reduced defects and triage costs, reduced outages, and reduced spending on security middleware. Partnering with IBM Services greatly expedited time-to-market, allowing the organization to recognize the benefits of OpenShift faster.

- The organization installed a continuous integration and continuous delivery (CI/CD) pipeline, with tight controls on processes and quality assurance, ultimately reducing bugs and costly reworks. This saved 20% annually on triage activities. The CTO detailed: "Because of the pipeline, our ability to put consistency and quality and rigor improved. The reusability of the CI/CD pipeline has helped us reduce defects,

which is a cost coefficient. It helps us reduce risk because we've put controls in place in the pipeline that were manual in nature that are now automated."

- The accelerated development time also allowed internal teams to update and fix applications faster, leading to fewer outages and better availability. This saved the organization 30% annually on outage expenses. The CTO explained: "We're bringing products to market more quickly, and part of that is our ability to evolve them. We evolve them quicker. Our ability to triage in the event that things aren't working right — defects, bugs, whatever — we're able to fix those faster. It's had a material impact on our availability scores and it's significantly improved our ability to recover from an issue. Our pain minutes have gone down substantially."
- The organization used its modernization initiative as an opportunity to rewrite and reduce the complexity of older security architecture and recognize further savings. Simpler architecture is easier to secure, reducing annual security architecture spend by 66%. The CTO stated: "We decommissioned numerous legacy applications or took versions running in J2EE or WebSphere and rewrote them. We've reduced a lot of complexity on the security side; some services were in old heavyweight environments and we got rid of them to reduce our risk and our expenses."

Modeling and assumptions. Forrester modeled the benefit of accelerated time-to-value based on the following assumptions:

- The organization containerizes and migrates 600 applications by Year 3, with a steady rollout of 100, 200, and 300 over the three-year period.
- In the prior environment, the organization incurred expenses of $8,000 per application due to outages and $8,000 per application in triage and fixes, and it spent $12,000 per application on security architecture.
- Working with IBM accelerated the time-to-value of these savings by 24 weeks. The benefit of IBM is a one-time time-to-market value, but the organization will continue to recognize the savings associated with OpenShift into the future.

"We're at 600 applications [on the platform] today, and my goal is 2,000 in the next 18 months. That will allow us to save probably 10% to 15% of our IT cost in engineering."

CTO, financial services

Risks. Forrester recognizes that these savings can vary from organization to organization based on factors such as historical availability, development costs, and security spending.

"I'm saving 20% to 25% annualized on engineering and triage elements. I'm finding issues before the start, so I don't have the issue."

CTO, financial services

Accelerated Time-To-Value Of OpenShift Platform					
Ref.	**Metric**	**Calculation**	**Year 1**	**Year 2**	**Year 3**
C1	Applications/services moved	B1	100	200	300
C2	Annual outages cost per service/app	Assumption	$8,000	$8,000	$8,000
C3	Outages savings on modern OpenShift platform	Interview	30%	30%	30%
C4	Outages savings per service per year	C2*C3	$2,400	$2,400	$2,400
C5	Annual application triage and fixes cost per service/app	Assumption	$8,000	$8,000	$8,000
C6	Application triage and fixes reduction on modern OpenShift platform	Interview	20%	20%	20%
C7	Application triage and fixes savings per service per year	C5*C6	$1,600	$1,600	$1,600
C8	Annual security architecture cost per service/app	Assumption	$12,000	$12,000	$12,000
C9	Security architecture savings on modern OpenShift platform	Interview	66%	66%	66%
C10	Security architecture savings per service per year	C8*C9	$7,920	$7,920	$7,920
C11	Weekly cost savings (rounded)	(C4+C7+C10)/52	$229	$229	$229
C12	Weeks of accelerated value recognition with IBM	Interview	24	24	24
Ct	Accelerated time-to-value of OpenShift platform	C1*C11*C12	$549,600	$1,099,200	$1,648,800
	Risk adjustment	↓15%			
Ctr	Accelerated time-to-value of OpenShift platform (risk-adjusted)		$467,160	$934,320	$1,401,480
	Three-year total: $2,802,960			**Three-year present value: $2,249,809**	

Synopsis. To account for these risks, Forrester adjusted this benefit downward by 15%, yielding a three-year, risk-adjusted total PV of $2 million.

UNQUANTIFIED BENEFITS

Additional benefits that the customer experienced but was not able to quantify include:

- **Improved agility.** The ability to develop and deliver applications quickly improves organizational reaction times.
- **New business capabilities and revenues.** With a continuous delivery platform and containerized microservices, the organization can develop

VOICE OF THE CUSTOMER

IMPROVED AGILITY

"We have specific applications that happened because of COVID-19 and economic issues. We needed to get these to market to serve our customers, and we were able to do that noticeably quicker than we would have in the regular environment."

NEW BUSINESS CAPABILITIES AND REVENUE STREAMS

"Our entire user experience is being rewritten to run on the platform so all of our customer-facing experiences on the web will be surfaced through there. We've started that redesign and we've been deploying there."

REDUCED HARDWARE FOOTPRINT

"We were in a highly utilized core infrastructure environment. Everything was virtualized with a lot of shared services. I've absolutely reduced some expenses, but I am anchored by business groups still on the old infrastructure. That's my anchor. And in the next 12 months, we will be able to see some lift in the cost reduction as we can retire shared infrastructure."

AVOID COSTLY RECRUITING

"The market is horrible right now. [Developers] are a super-hot commodity."

flexible, future-proof applications to better serve its customers.

- **Reduced hardware footprint**. Modernized and cloud-native applications make legacy hardware redundant.
- **Avoid costly recruiting.** Beyond the direct wage savings of avoided head count, the organization also avoided the costly recruitment process for developers.

FLEXIBILTY

The value of flexibility is unique to each customer. There are multiple scenarios in which a customer might invest in IBM Services and later realize additional uses and business opportunities, including:

- **Additional IBM services.** IBM offers additional services, such as Garage, to help customers innovate. IBM Garage helps its clients innovate like a start-up — even enterprises burdened with waterfall process and legacy technology. IBM Garage's structured innovation methodology unites design thinking's customer-centric cross-functional co-creation with the speed and agility of Agile and DevOps. This is backed by continuous tracking and reporting of business value metrics, and enhanced with IBM's technical and industry acumen.
- **Partner with IBM to develop other Red Hat programs.** IBM offers skilled design and development services for Red Hat products, allowing the organization to recognize additional developmental savings if it adopts other Red Hat products at scale.

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

Analysis Of Costs

Quantified cost data

Total Costs							
Ref.	**Cost**	**Initial**	**Year 1**	**Year 2**	**Year 3**	**Total**	**Present Value**
Dtr	Engagement fees	$3,080,000	$3,080,000	$6,160,000	$6,160,000	$18,480,000	$15,599,008
Etr	Project management and coordination	$0	$55,770	$111,540	$185,900	$353,210	$282,551
	Total costs (risk-adjusted)	$3,080,000	$3,135,770	$6,271,540	$6,345,900	$18,833,210	$15,881,559

ENGAGEMENT FEES

IBM Services engagements are priced based on required time and materials. IBM worked with the client to develop a proof of concept and competency prior to the full engagement, ensuring that delivery needs could be met.

Modeling and assumptions. Forrester modeled costs assuming that time and materials scale with the number of applications being developed each year and the related resources. The organization incurred some expense prior to launch developing and testing a proof of concept and training IBM developers on the specifics of the engagement.

Risks. Costs will vary based on the number of resources desired, the level of expertise needed, the length of projects, the number of project teams, and the region in which the resources are located.

Synopsis. To account for these risks, Forrester adjusted this cost upward by 10%, yielding a three-year, risk-adjusted total PV (discounted at 10%) of $16 million.

Engagement Fees						
Ref.	**Metric**	**Calculation**	**Initial**	**Year 1**	**Year 2**	**Year 3**
D1	Engagement fees	Interview	$2,800,000	$2,800,000	$5,600,000	$5,600,000
Dt	Engagement fees	D1	$2,800,000	$2,800,000	$5,600,000	$5,600,000
	Risk adjustment	↑10%				
Dtr	Engagement fees (risk-adjusted)		$3,080,000	$3,080,000	$6,160,000	$6,160,000
	Three-year total: $18,480,000			**Three-year present value: $15,599,008**		

PROJECT MANAGEMENT AND COORDINATION

As the IBM Services development service is integrated into its DevOps, the organization requires cross-functional employees and leaders to play a direct role in innovation and development.

Scrum teams hold 30-minute biweekly meetings to review the status of projects and plan for future work.

Modeling and assumptions. The process required internal labor from IT administrators, developers, and cross-functional leadership. Quantifying the number of hours through each step (planning, scoping, piloting, implementing, and managing) is an essential part of the business case. Organizations typically devote multiple resources to these efforts full-time, and a large number (anywhere from 20 to 50) of cross- functional employees pitch in anywhere from a few hours to half their workload. With most of these employees earning well over $100,000 a year in fully burdened salary, these costs are significant.

Risks. Actual labor costs will vary by organization, type of project, project complexity, project scale, regional salaries, and DevOps practices.

Synopsis. To account for these risks, Forrester adjusted this cost upward by 10%, yielding a three-year, risk-adjusted total PV of $282,551.

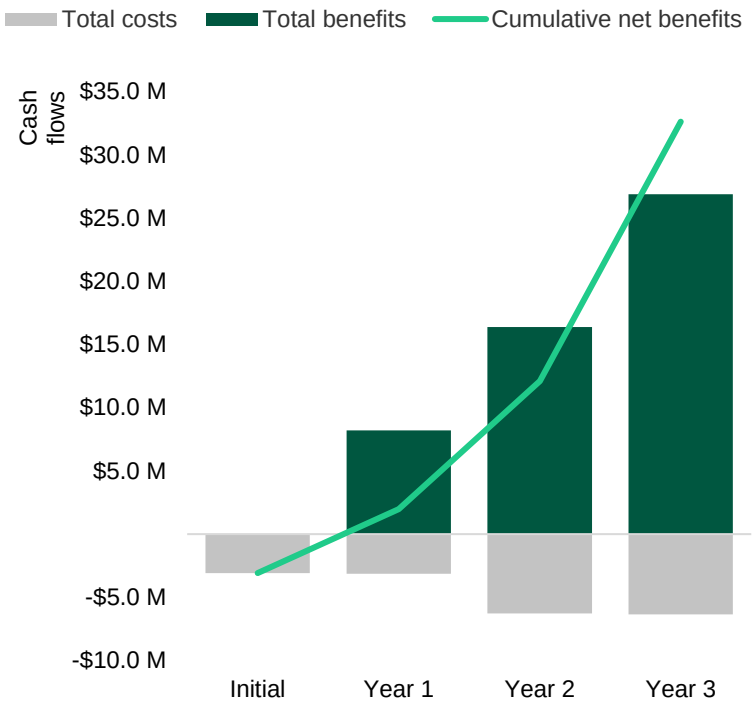
Project Management And Coordination

Ref.	Metric	Calculation	Initial	Year 1	Year 2	Year 3
E1	Labor hours of project management per scrum team	Assumption	$0	$50,700	$101,400	$169,000
Et	Project management and coordination	E1	$0	$50,700	$101,400	$169,000
	Risk adjustment	↑10%				
Etr	Project management and coordination (risk-adjusted)		$0	$55,770	$111,540	$185,900
	Three-year total: $353,210			**Three-year present value: $282,551**		

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	($3,080,000)	($3,135,770)	($6,271,540)	($6,345,900)	($18,833,210)	($15,881,559)
Total benefits	$0	$8,194,560	$16,389,120	$26,878,680	$51,462,360	$41,188,678
Net benefits	($3,080,000)	$5,058,790	$10,117,580	$20,532,780	$32,629,150	$25,307,119
ROI						159%
Payback						8 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."

PRESENT VALUE (PV)

The present or current value of (discounted) cost and benefit estimates given at an interest rate (the discount rate). The PV of costs and benefits feed into the total NPV of cash flows.

NET PRESENT VALUE (NPV)

The present or current value of (discounted) future net cash flows given an interest rate (the discount rate). A positive project NPV normally indicates that the investment should be made, unless other projects have higher NPVs.

RETURN ON INVESTMENT (ROI)

A project's expected return in percentage terms. ROI is calculated by dividing net benefits (benefits less costs) by costs.

DISCOUNT RATE

The interest rate used in cash flow analysis to take into account the time value of money. Organizations typically use discount rates between 8% and 16%.

PAYBACK PERIOD

The breakeven point for an investment. This is the point in time at which net benefits (benefits minus costs) equal initial investment or cost.

Appendix B: Supplemental Material

“Your Transformation Strategy Requires Structured Innovation,” a commissioned study conducted by Forrester Consulting on behalf of IBM, October 2020.

“Emerging Technology Assessment: The Total Economic Impact™ Of Using Both IBM And Red Hat Solutions Together,” a commissioned study conducted by Forrester Consulting on behalf of IBM, June 2019.

Appendix C: Endnotes

[1] Source: “Now Tech: Public Cloud Development Platforms, Q1 2020,” Forrester Research, Inc., March 4, 2020.

[2] Ibid.

[3] Source: “Modernize Core Applications With Cloud,” Forrester Research, Inc., August 5, 2019.

[4] Source: “Monoliths Benefit From Both Containers and Microservices,” Forrester Research, Inc., June 26, 2017.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