A Forrester Total Economic Impact™ Study

Commissioned By

IBM

Project Director:
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The Total Economic Impact™ Of IBM PureApplication System

FORRESTER®

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Executive Summary

In June 2014, IBM commissioned Forrester Consulting to conduct a Total Economic Impact™ (TEI) study and examine the potential return on investment (ROI) enterprises may realize by deploying the IBM PureApplication System. The purpose of this study is to provide readers with a framework to evaluate the potential financial impact of the IBM PureApplication System on their organizations.

> *"Provisioning environments used to take six to eight weeks . . . with IBM PureApplication System, we have now got that down to 12 minutes for development, staging, QA, and production environments."*
>
> **~Enterprise architect, large financial services provider in the Americas**

To better understand the benefits, costs, and risks associated with the IBM PureApplication System, Forrester interviewed an existing customer using the IBM PureApplication System in a production environment. IBM PureApplication System converges compute, storage, networking components, and software into a preconfigured and pretested system. The pre-integration seeks to decrease time and effort for initial installation, and the pre-installed application patterns seek to decrease barriers to application development and deployment effort.

Prior to IBM PureApplication System, the customer ran over 2,000 middleware instances with multiple physical servers controlled by its parent company. The customer chose IBM PureApplication System to realize the organization's vision of improved performance, and it subsequently experienced benefits in application development and deployment time, hardware and related utility cost avoidances, and increased system resiliency.

IBM PUREAPPLICATION SYSTEM DECREASES IT MAINTENANCE AND ADMINISTRATIVE EFFORT, REDUCES APPLICATION DEVELOPMENT AND DEPLOYMENT TIME, AND ENHANCES BUSINESS CAPABILITIES AND SYSTEM RESILIENCY

Our interview with one existing customer and subsequent financial analysis found that the customer experienced the risk-adjusted ROI, benefits, and costs shown in Figure 1.[1] Please see Appendix A for a description of the interviewed customer.

The analysis results in projected benefits of $13.5 million versus costs of $7.2 million, adding up to a net present value (NPV) of almost $6.3 million over three years.

FIGURE 1
Financial Summary Showing Three-Year Risk-Adjusted Results

Source: Forrester Research, Inc.

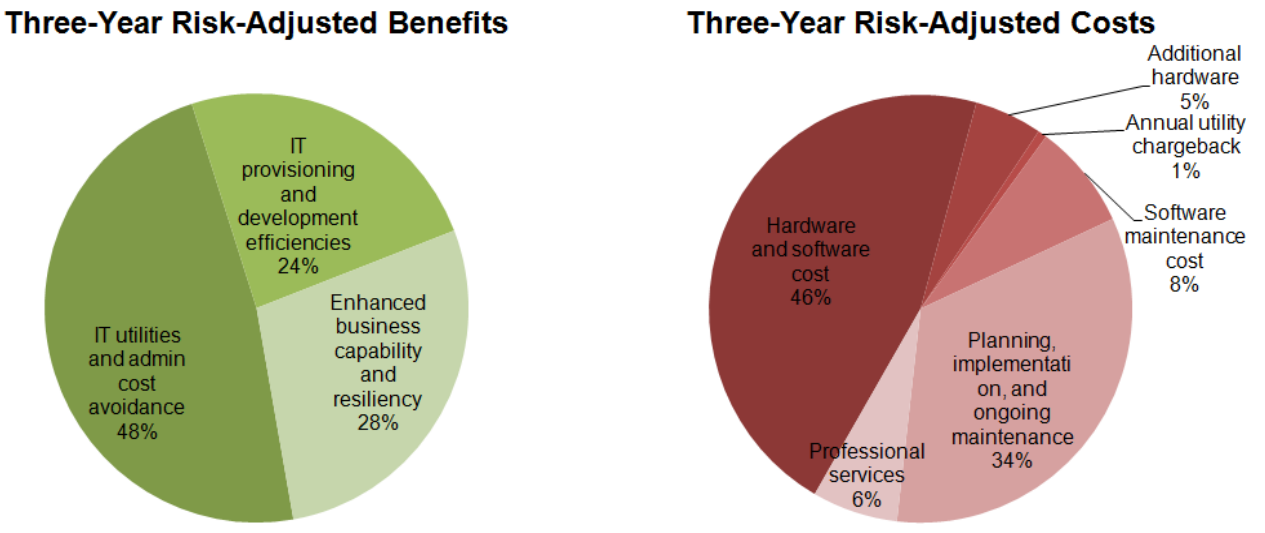
› **Benefits.** The customer experienced the following risk-adjusted benefits:

- **IT utilities and administrative cost avoidance.** This benefit centers on the monthly chargeback that is avoided by reducing middleware instances and physical servers needed. By consolidating platforms, the customer is also able to converge administrative roles and skill sets.
- **IT provisioning and development efficiencies.** This benefit focuses on the reduced time and effort of provisioning application development environments and deploying live applications.
- **Enhanced business capability and resiliency.** This benefit details the value of increased resiliency both in terms of revenue opportunity and break-fix labor avoided.

› **Costs.** The customer experienced the following risk-adjusted costs:

- **Hardware cost.** This cost centers on the initial cost of the IBM PureApplication System.
- **Additional hardware.** This cost focuses on the additional networking hardware that the customer invested in as part of the organization's effort to build isolation and mitigate full dependency on the IBM PureApplication System.
- **Annual utility chargeback.** This cost details the monthly chargeback the customer pays to the parent organization for hosting the IBM PureApplication System at the parent organization's data centers.
- **Software maintenance cost.** This cost displays the annual software maintenance cost as a percentage of the initial investment.
- **Planning, implementation, and ongoing maintenance.** This cost includes the time and effort put toward planning, implementing the proof of concept (PoC), migration, and ongoing maintenance.
- **Professional services.** This cost showcases the IBM Accelerated Value Program (AVP) team that the customer contracts each year.

FIGURE 2
Three-Year Risk-Adjusted Cost/Benefit Breakdown



Source: Forrester Research, Inc.

Disclosures

The reader should be aware of the following:

- The study is commissioned by IBM and delivered by Forrester Consulting. It is not meant to be used as a competitive analysis.
- Forrester makes no assumptions as to the potential return on investment that other organizations will receive. Forrester strongly advises that readers use their own estimates within the framework provided in the report to determine the appropriateness of an investment in IBM PureApplication System.
- IBM reviewed and provided feedback to Forrester, but Forrester maintains editorial control over the study and its findings and does not accept changes to the study that contradict Forrester's findings or obscure the meaning of the study.
- The customer names for the interviews were provided by IBM. IBM did not participate in customer interviews.

TEI Framework And Methodology

INTRODUCTION

From the information provided in the interviews, Forrester has constructed a Total Economic Impact™ (TEI) framework for those organizations considering deploying IBM PureApplication System. The objective of the framework is to identify the cost, benefit, flexibility, and risk factors that affect the investment decision.

APPROACH AND METHODOLOGY

Forrester took a multistep approach to evaluate the impact that IBM PureApplication System can have on an organization (see Figure 3). Specifically, we:

- Interviewed IBM marketing, sales, and/or consulting personnel, along with Forrester analysts, to gather data relative to IBM PureApplication System and the marketplace for IBM PureApplication System.
- Interviewed one organization currently using IBM PureApplication System to obtain data with respect to costs, benefits, and risks.
- Constructed a financial model representative of the interviews using the TEI methodology. The financial model is populated with the cost and benefit data obtained from the customer interview.
- Risk-adjusted the financial model based on issues and concerns the interviewed organization highlighted in interviews. Risk adjustment is a key part of the TEI methodology. While the interviewed organization provided cost and benefit estimates, some categories included a broad range of possibilities or had a number of outside forces that might have affected the benefit and cost values to be higher or lower. For that reason, some cost and benefit totals have been risk-adjusted, and are detailed in each relevant section.

Forrester employed four fundamental elements of TEI in modeling IBM PureApplication System's value: benefits, costs, flexibility, and risks.

Given the increasing sophistication that enterprises have regarding ROI analyses related to IT investments, Forrester's TEI methodology serves to provide a complete picture of the total economic impact of purchase decisions. Please see Appendix B for additional information on the TEI methodology.

FIGURE 3
TEI Approach

Source: Forrester Research, Inc.

Analysis

INTERVIEWED CUSTOMER

For this study, we conducted one interview with an existing customer of IBM PureApplication System. The interviewed customer is a financial services subsidiary based in North America with operations specific to the Americas region. The customer has the following high-level characteristics:

- $7 billion in annual revenue.
- Total headcount of 8,000 people with 600 in IT.
- Focused on corporate equipment leases and loans.
- Part of a larger North American conglomerate.

The customer is familiar with IBM's products and has used MQ Broker for 12 years. Based on that middleware experience, the customer had subsequently adopted other IBM applications such as Business Process Manager (BPM), Business Activities Monitor (BAM), and Cast Iron.

When the customer onboarded a new executive to its enterprise architecture practice, the new executive conducted a two-month review of the environment and its gaps. At the conclusion of the review, one of the top initiatives that materialized was to test whether IBM PureApplication System might be a viable path for the organization's future. This effort would also allow the customer to simplify and standardize on WebSphere Application Server (WAS) and IBM PureApplication System. This essentially reduces the platform footprint, which included JBoss, Oracle WebLogic, Apache Tomcat, and WAS.

The customer then worked with IBM to conduct a PoC to map out the feasibility and effort needed to migrate from its existing platform to WAS and then to IBM PureApplication System. To be conservative, as this was a shift in platform environments and infrastructure, the customer doubled the typical PoC and planning period of three months to six months.

At the end of the PoC, the customer decided to continue the transformation with the following goals:

- Identify, prioritize, and migrate 10 applications that represent best use cases.
- Decrease monthly middleware administrators, physical servers, and related utilities chargeback to the parent organization.
- Leverage IBM's application patterns to increase provisioning capacity and decrease deployment time.
- Improve system resiliency by simplifying the environment, increasing development transparency, and automating outage prevention.

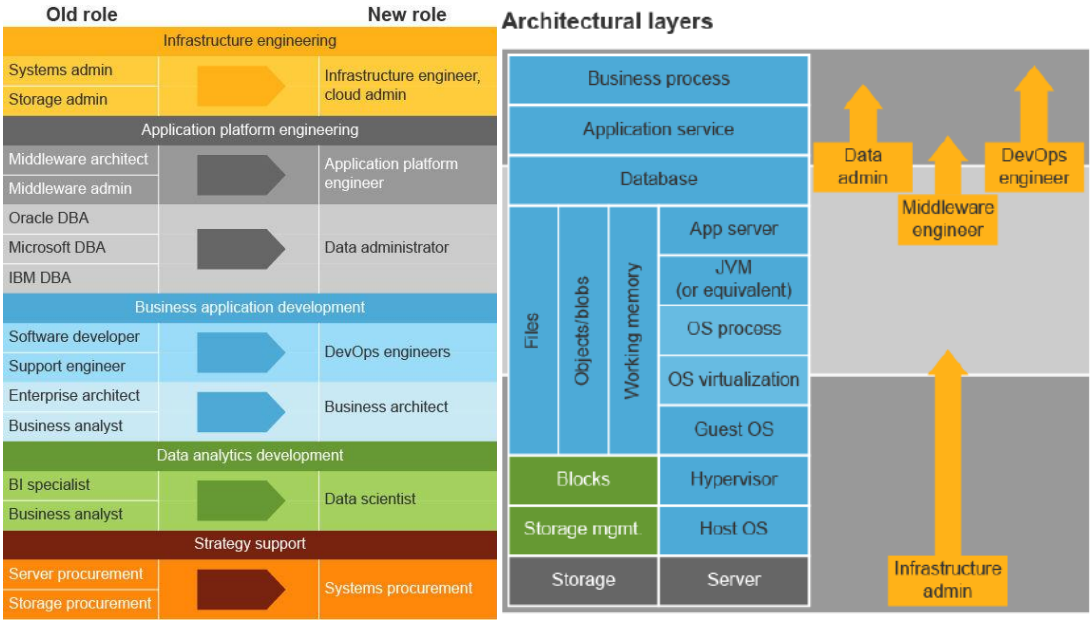
> *"We are setting health policies that will programmatically monitor CPU utilization, and if it hits a certain threshold, an action will be triggered — automated outage avoidance. We won't hit 'out of memory' and unprocessed transactions that need 15 people to fix anymore."*
>
> ~Enterprise architect, large financial services provider in the Americas

INTERVIEW HIGHLIGHTS

The interview revealed the following themes:

- **The customer built a strong business case based primarily on the "hard benefits" of physical server reduction and layered productivity and efficiency gains.** The customer noted that the average cost avoidance of $1,200 per month in server chargebacks for 105 servers was clear and strong enough to drive its business case forward. For an initial investment of $3.2 million, the customer would recoup the investment in 17 to 18 months. With this foundational benefit set, the customer then mentioned the different productivity and efficiency gains that would result in months after deploying the system. It is highlighted that even without a clear estimation of the productivity and efficiency gains, the hard benefits of the business case justified the investment for this study's customer.
- **Organizational buy-in is vital as converged infrastructure also means converged environments and converged roles.** Pre-integrating and preconfiguring compute, storage, networking, application deployment patterns, and management software allows the customer to deploy hardware into production with less time and effort that not only includes time and effort for installing, wiring, and configuring, but also extends to reduced time and effort for procurement, administrators, and application developers. By consolidating platforms to WAS, the customer was able to consolidate multiple roles and free up time for existing administrators. These shifts in organizational structure, role definition, and control of the physical hardware and software configurations need to be clearly mapped out and discussed, and change management plans need to be implemented to gain buy-in for all impacted staff. A previous Forrester Thought Leadership Paper commissioned by IBM highlights the potential organizational changes, role convergence, and impacts, as shown in Figure 4.

FIGURE 4
Narrow Technical Roles Combine And Converge, And IT Roles Move Up The Stack



Source: A commissioned study conducted by Forrester Consulting on behalf of IBM, April 2013

- **The customer experienced material increase in efficiency of deploying hardware, provisioning environments, and deploying applications.** The average time to deploy an application into production was reduced from six months to two months — a 67% improvement. Provisioning different environments for the development process was reduced from six weeks to 12 minutes. The results may also be achieved with minimal ramp-up, as the customer's first application, from hardware delivery to product go-live, was deployed in 90 days — a 50% improvement on the first try.

BENEFITS

The customer experienced a number of quantified benefits in this case study:

- IT utilities and administrative cost avoidance.
- IT provisioning and development efficiencies.
- Enhanced business capability and resiliency.

IT Utilities And Administrative Cost Avoidance

The customer's application servers are provided by its parent organization's centralized IT shared services through a chargeback model. The average monthly cost per server is $1,200. The customer invested in IBM PureApplication System and put two physical systems in two separate data centers that the parent organization manages. Going forward, the customer would gradually decommission 105 servers and rely on the two IBM PureApplication Systems.

Furthermore, the customer estimated $2 million in annual spend for administrators of its previous environment that included JBoss, Oracle WebLogic, Apache Tomcat, and WAS. By consolidating to WAS, roles were converged and the customer would have a lower administrative cost burden. Over three years and after adjusting for risk, the value of IT utilities and administrative cost avoidance is $7.9 million as shown in Table 1.

TABLE 1
IT Utilities And Administrative Cost Avoidance

Ref.	Metric	Calculation	Year 1	Year 2	Year 3
A1	Server utility cost per month	Customer-reported	$1,200	$1,200	$1,200
A2	Servers reduced	Customer-reported	45	90	105
A3	Annual administrative cost	Customer-reported	$2,000,000	$2,060,000	$2,121,800
A4	Administrative cost reduction	Customer-reported	75%	75%	75%
At	IT utilities and administrative cost avoidance	(A2*(A1*X3))+(A3*A4)	$2,148,000	$2,841,000	$3,103,350
	Risk adjustment	↓ 3%			
Atr	**IT utilities and administrative cost avoidance (risk-adjusted)**		**$2,083,560**	**$2,755,770**	**$3,010,250**

Source: Forrester Research, Inc.

IT Provisioning And Development Efficiencies

While the largest efficiency improvement is the time and effort it takes to provision environments, the customer experienced a holistic impact to the entire application development cycle. Pattern-based provisioning reduced this activity from six weeks to 12 minutes. Overall, the average application development cycle is reduced from six months to two months.

This improvement in efficiency coupled with certain incremental investments by the customer allowed the organization to deploy 50 applications into production in its first 15 months of using IBM PureApplication System. Furthermore, the customer highlighted that pattern-based provisioning innately created a policy that would disallow developers from accidentally changing configurations between development and QA environments, which created configuration drift. This saves the organization at least three days of triaging and performing root-cause analysis each time a configuration drift occurs.

Over three years and after adjusting for risk, the value of improved efficiency in IT provisioning and application development is $4 million, as shown in Table 2.

TABLE 2
IT Provisioning And Development Efficiencies

Ref.	Metric	Calculation	Year 1	Year 2	Year 3
B1	Previous time to develop, test, and deploy application (months)	Customer-reported	6	6	6
B2	Current time to develop, test, and deploy application (months)	Customer-reported	2	2	2
B3	Application development cost FTE per month	Customer-reported	1	1	1
B4	Internal FTE annual salary	Year 1: X6 Year 2 and 3: $B4_{py}$*(1+X8)	$120,000	$123,600	$127,308
B5	Cost saving per application	(B4*B3)*(B2/B1)	$40,000	$41,200	$42,436
B6	Applications deployed per year	Customer-reported	17	33	50
Bt	IT provisioning and development efficiencies	B5*B6	$680,000	$1,359,600	$2,121,800
	Risk adjustment	↓ 3%			
Btr	**IT provisioning and development efficiencies (risk-adjusted)**		**$659,600**	**$1,318,812**	**$2,058,146**

Source: Forrester Research, Inc.

Enhanced Business Capability And Resiliency

In addition to having better control on configuration of provisioned environments through patterns, the customer was also able to simplify its topology and increase transparency for developers. Previously, developers had to submit a ticket to application server administrators to see their logs for debugging purposes. A single point of logging and single logviewer for IBM PureApplication System now allows greater transparency and increases the developers' efficiency.

To improve resiliency, the customer implemented WAS health policies. These policies essentially monitor different system thresholds and automatically take predesignated actions to prevent a system outage. The customer estimated 30 outages previously, with each taking 1 hour to resolve. Not only does this downtime translate into lost revenue opportunity, it also translates into time and effort needed to resolve the outage.

Based on a $7 billion annual revenue, the customer could lose $24 million each year due to outages. To be realistic, we use a conservative industry sales conversion rate of 6.25%, which results in $1.5 million in lost revenue opportunity.[2] Additionally, the time and effort avoided for 15 resources are included in this benefit of $4.6 million over three years after adjusting for risk, as shown in Table 3.

TABLE 3
Enhanced Business Capability And Resiliency

Ref.	Metric*	Calculation	Year 1	Year 2	Year 3
C1	Annual revenue	Year 1: Customer-reported Year 2 and 3: $C1_{py}$*(1+X8)	$7,000,000,000	$7,210,000,000	$7,426,300,000
C2	Revenue per hour	C1/X5	$799,087	$823,059	$847,751
C3	Outages per year	Customer-reported	30	30	30
C4	Hours down per outage	Customer-reported	1	1	1
C5	Annual revenue opportunity lost	C3*C4*C2	$23,972,603	$24,691,781	$25,432,534
C6	Sales conversion rate	Assumption	6.25%	6.25%	6.25%
C7	Annual converted revenue lost	C5*C6	$1,498,288	$1,543,236	$1,589,533
C8	FTEs needed to resolve outage	Customer-reported	15	15	15
C9	FTE hourly wage	Year 1: X6/X4 Year 2 and 3: $C9_{py}$*(1+X8)	$57.69	$59.42	$61.21
C10	Outage resolution cost	C8*(C3*C4)*C9	$25,962	$26,740	$27,543
Ct	Enhanced business capability and resiliency	C7+C10	$1,524,249	$1,569,977	$1,617,076
	Risk adjustment	↓ 3%			
Ctr	**Enhanced business capability and resiliency (risk-adjusted)**		**$1,478,522**	**$1,522,877**	**$1,568,564**

Source: Forrester Research, Inc.

Total Benefits

Table 4 shows the total of all benefits across the three areas listed above, as well as present values (PVs) discounted at 10%. Over three years, the customer expects risk-adjusted total benefits to be a PV of $13.5 million.

TABLE 4
Total Benefits (Risk-Adjusted)

Benefit	Initial	Year 1	Year 2	Year 3	Total	Present Value
IT utilities and administrative cost avoidance	$0	$2,083,560	$2,755,770	$3,010,250	$7,849,580	$6,433,286
IT provisioning and development efficiencies	$0	$659,600	$1,318,812	$2,058,146	$4,036,558	$3,235,879
Enhanced business capability and resiliency	$0	$1,478,522	$1,522,877	$1,568,564	$4,569,963	$3,781,172
Total benefits	$0	$4,221,682	$5,597,459	$6,636,959	$16,456,100	$13,450,338

Source: Forrester Research, Inc.

COSTS

The customer experienced a number of costs associated with IBM PureApplication Systems:

- Hardware cost.
- Additional hardware.
- Annual utility chargeback.
- Software maintenance cost.
- Planning, implementation, and ongoing maintenance.
- Professional services.

Total Costs

The customer paid $3.2 million for the two IBM PureApplication Systems with the following specifications per system:

- 96 cores (16 cores x six nodes).
- 48 TB SAN storage.
- 1.5 TB RAM (256 GB x six nodes).

Additional hardware, primarily network switches, was purchased due to the organization's desire for a more conservative approach of partially separating full dependency on the IBM PureApplication hardware. The two systems would be placed in two separate data centers, and the parent organization would continue to charge monthly utilization fees for power, cooling, and network. Software maintenance is a negotiated rate based on the system's original cost.

The customer dedicated 2.5 full-time equivalents (FTEs) for six months during project initiation and the PoC. Afterwards, a decision was made to increase investment in resources to decrease the payback period. Thus, the customer brought on one scripting specialist to customize patterns, two consultants to assist with migrations, one Tivoli specialist to assist with monitoring in Year 2, along with four internal FTEs. A separate contract for IBM's Accelerated Value Program (AVP) was also purchased. External support is modeled to decrease time. Table 5 shows the total of all costs across the six areas listed above, as well as PVs discounted at 10%. Over three years, the customer expects risk-adjusted total costs to be $7.2 million.

TABLE 5
Total Costs (Risk-Adjusted)

Cost	Initial	Year 1	Year 2	Year 3	Total	Present Value
Hardware cost	$3,296,000	$0	$0	$0	$3,296,000	$3,296,000
Additional hardware	$370,800	$0	$0	$0	$370,800	$370,800
Annual utility chargeback	$0	$19,776	$19,776	$19,776	$59,328	$49,180
Software maintenance cost	$0	$230,720	$230,720	$230,720	$692,160	$573,766
Planning, implementation, and ongoing maintenance	$339,900	$1,137,120	$1,025,633	$262,254	$2,764,907	$2,418,312
Professional services	$0	$188,833	$188,833	$188,833	$566,500	$469,601
Total costs	$4,006,700	$1,576,449	$1,464,962	$701,584	$7,749,695	$7,177,659

Source: Forrester Research, Inc.

FLEXIBILITY

Flexibility, as defined by TEI, represents an investment in additional capacity or capability that could be turned into business benefit for some future additional investment. This provides an organization with the "right" or the ability to engage in future initiatives but not the obligation to do so. There are multiple scenarios in which a customer might choose to implement IBM PureApplication System and later realize additional uses and business opportunities. Flexibility would also be quantified when evaluated as part of a specific project (described in more detail in Appendix B).

The customer highlighted three main initiatives going forward in addition to continuing to develop and migrate applications to IBM PureApplication System. The first is to expand its automated monitoring and to configure policies appropriately to prevent system outages. This will take tuning, as the customer will both need to set thresholds and determine the appropriate action at each threshold. Once the tuning is complete, the customer envisions only getting a notification that a threshold was reached, a programmed action was taken automatically , and no further manual action is needed from the administrators.

The second and third initiatives are to scale out. The customer consolidated its Unix and Linux workloads but still has a large Windows footprint. The customer expects to begin mapping out the challenges and gaps for the Windows environment at the end of 2014.

Lastly, the customer has a full use license for IBM DB2 but has not widely used it yet due to the organization's Oracle background. The organization will likely launch a study to investigate how to incorporate or whether to move completely to DB2.

RISKS

Forrester defines two types of risk associated with this analysis: "implementation risk" and "impact risk." "Implementation risk" is the risk that a proposed investment in IBM PureApplication System may deviate from the original or expected requirements, resulting in higher costs than anticipated. "Impact risk" refers to the risk that the business or technology needs of the organization may not be met by the investment in IBM PureApplication System, resulting in lower overall total benefits. The greater the uncertainty, the wider the potential range of outcomes for cost and benefit estimates.

Quantitatively capturing implementation risk and impact risk by directly adjusting the financial estimates results provides more meaningful and accurate estimates and a more accurate projection of the ROI. In general, risks affect costs by raising the original estimates, and they affect benefits by reducing the original estimates. The risk-adjusted numbers should be taken as "realistic" expectations since they represent the expected values considering risk.

The following impact risks that affect benefits are identified as part of the analysis:

- Lower than expected amount of physical servers to decommission.
- Minimal application development and deployment needs.
- Below average sales conversion rate.
- Environments with minimal outages.

The following implementation risks that affect costs are identified as part of this analysis:

- Price changes to IBM and relevant hardware, software, and services.
- Incremental investment to either troubleshoot or decrease payback period.

Table 6 shows the values used to adjust for risk and uncertainty in the cost and benefit estimates. Readers are urged to apply their own risk ranges based on their own degree of confidence in the cost and benefit estimates.

TABLE 6
Benefit And Cost Risk Adjustments

Benefits	Adjustment
IT utilities and administrative cost avoidance	↓ 3%
IT provisioning and development efficiencies	↓ 3%
Enhanced business capability and resiliency	↓ 3%

Costs	Adjustment
Hardware cost	↑ 3%
Additional hardware	↑ 3%
Annual utility chargeback	↑ 3%
Software maintenance cost	↑ 3%
Planning, implementation, and ongoing maintenance	↑ 3%
Professional services	↑ 3%

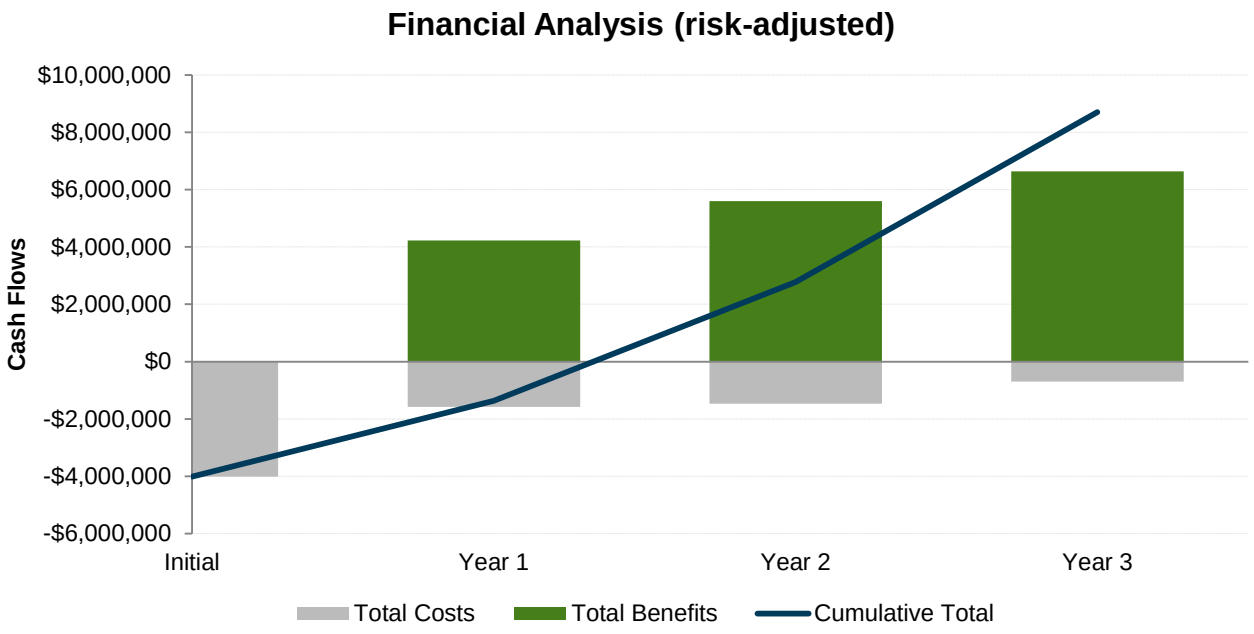
Source: Forrester Research, Inc.

Financial Summary

The financial results calculated in the Benefits and Costs sections can be used to determine the ROI, NPV, and payback period for the organization's investment in IBM PureApplication System.

Table 7 below shows the risk-adjusted ROI, NPV, and payback period values. These values are determined by applying the risk-adjustment values from Table 6 in the Risks section to the unadjusted results in each relevant cost and benefit section.

FIGURE 5
Cash Flow Chart (Risk-Adjusted)



Source: Forrester Research, Inc.

TABLE 7
Cash Flow (Risk-Adjusted)

	Initial	Year 1	Year 2	Year 3	Total	Present Value
Costs	($4,006,700)	($1,576,449)	($1,464,962)	($701,584)	($7,749,695)	($7,177,659)
Benefits	$0	$4,221,682	$5,597,459	$6,636,959	$16,456,100	$13,450,338
Net benefits	($4,006,700)	$2,645,232	$4,132,497	$5,935,375	$8,706,405	$6,272,679
ROI			87%			
Payback period			16 months			

Source: Forrester Research, Inc.

IBM PureApplication Systems: Overview

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

IBM PureApplication System is a cloud application platform that can accelerate time to value and automate deployment and life-cycle management for a broad range of applications.

APPLICATION OWNERS: DEPLOY NEW APPLICATIONS FASTER

Through the deep levels of integration across hardware and middleware, and the use of patterns, new applications can be deployed in minutes or hours versus weeks or months. Provisioning, scaling, security, high availability, and other application attributes and activities are automatically managed across applications and system resources based on policies that can easily be assigned, adjusted, and prioritized.

ENTERPRISE ARCHITECTS: TRANSFORM IT WITH CLOUD AND STREAMLINE THROUGH CONSOLIDATION

IBM PureApplication System delivers a cloud application platform out of the box. This can transform how your IT organization creates and runs applications with consolidation, driving efficiency across processes, breaking down traditional IT silos, and lowering the center of gravity. IBM PureApplication System can reduce labor costs compared with traditional IT models.

Appendix A: Interviewed Customer Description

For this study, we conducted one interview with an existing customer of IBM PureApplication System. The interviewed customer is a financial services subsidiary based in North America with operations specific to the Americas region. The customer has the following high-level characteristics:

- $7 billion in annual revenue.
- Total headcount of 8,000 people with 600 in IT.
- Focused on corporate equipment leases and loans.
- Part of a larger North American conglomerate.

The customer is familiar with IBM's products and has used MQ Broker for 12 years. Based on that middleware experience, the customer had subsequently adopted other IBM applications such as BPM, BAM, and Cast Iron.

When the customer onboarded a new executive to its enterprise architecture practice, the new executive conducted a two-month review of the environment and its gaps. At the conclusion of the review, one of the top initiatives that materialized was to test whether IBM PureApplication System might be a viable path for the organization's future. This effort would also allow the customer to simplify and standardize on WAS and IBM PureApplication System. This essentially reduces the platform footprint, which included JBoss, Oracle WebLogic, Apache Tomcat, and WebSphere Application Server.

FRAMEWORK ASSUMPTIONS

Table 8 provides the model assumptions that Forrester used in this analysis.

The discount rate used in the PV and NPV calculations is 10%, and the time horizon used for the financial modeling is three years. Organizations typically use discount rates between 8% and 16% based on their current environment. Readers are urged to consult with their respective company's finance department to determine the most appropriate discount rate to use within their own organizations.

TABLE 8
Model Assumptions

Ref.	Metric	Calculation	Value
X1	Hours per week		40
X2	Weeks per year		52
X3	Months per year		12
X4	Hours per year (M-F, 9-5)		2,080
X5	Hours per year (24x7)		8,760
X6	Internal IT FTE annual salary		$120,000
X7	Business resource hourly wage		$50
X8	Annual organization growth		3%
PY	Prior year		

Source: Forrester Research, Inc.

Appendix B: Total Economic Impact™ Overview

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.

The TEI methodology consists of four components to evaluate investment value: benefits, costs, flexibility, and risks.

BENEFITS

Benefits represent the value delivered to the user organization — IT and/or business units — by the proposed product or project. Often, product or project justification exercises focus just on IT cost and cost reduction, leaving little room to analyze the effect of the technology on the entire organization. The TEI methodology and the resulting financial model place 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. Calculation of benefit estimates involves a clear dialogue with the user organization to understand the specific value that is created. In addition, Forrester also requires that there be a clear line of accountability established between the measurement and justification of benefit estimates after the project has been completed. This ensures that benefit estimates tie back directly to the bottom line.

COSTS

Costs represent the investment necessary to capture the value, or benefits, of the proposed project. IT or the business units may incur costs in the form of fully burdened labor, subcontractors, or materials. Costs consider all the investments and expenses necessary to deliver the proposed value. In addition, the cost category within TEI captures any incremental costs over the existing environment for ongoing costs associated with the solution. All costs must be tied to the benefits that are created.

FLEXIBILITY

Within the TEI methodology, direct benefits represent one part of the investment value. While direct benefits can typically be the primary way to justify a project, Forrester believes that organizations should be able to measure the strategic value of an investment. Flexibility represents the value that can be obtained for some future additional investment building on top of the initial investment already made. For instance, an investment in an enterprisewide upgrade of an office productivity suite can potentially increase standardization (to increase efficiency) and reduce licensing costs. However, an embedded collaboration feature may translate to greater worker productivity if activated. The collaboration can only be used with additional investment in training at some future point. However, having the ability to capture that benefit has a PV that can be estimated. The flexibility component of TEI captures that value.

RISKS

Risks measure the uncertainty of benefit and cost estimates contained within the investment. Uncertainty is measured in two ways: 1) the likelihood that the cost and benefit estimates will meet the original projections and 2) the likelihood that the estimates will be measured and tracked over time. TEI applies a probability density function known as "triangular distribution" to the values entered. At a minimum, three values are calculated to estimate the underlying range around each cost and benefit.

Appendix C: Glossary

Discount rate: The interest rate used in cash flow analysis to take into account the time value of money. Companies set their own a discount rate based on their business and investment environment. Forrester assumes a yearly discount rate of 10% for this analysis. Organizations typically use discount rates between 8% and 16% based on their current environment. Readers are urged to consult their respective organizations to determine the most appropriate discount rate to use in their own environment.

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.

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.

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.

Return on investment (ROI): A measure of a project's expected return in percentage terms. ROI is calculated by dividing net benefits (benefits minus costs) by costs.

A NOTE ON CASH FLOW TABLES

The following is a note on the cash flow tables used in this study (see the example table below). The initial investment column contains costs incurred at "time 0" or at the beginning of Year 1. Those costs are not discounted. All other cash flows in years 1 through 3 are discounted using the discount rate (shown in Framework Assumptions section) at the end of the year. PV calculations are calculated for each total cost and benefit estimate. NPV calculations are not calculated until the summary tables are the sum of the initial investment and the discounted cash flows in each year.

TABLE [EXAMPLE]
Example Table

Ref.	Metric	Calculation	Year 1	Year 2	Year 3

Source: Forrester Research, Inc.

Appendix D: Endnotes

[1] Forrester risk-adjusts the summary financial metrics to take into account the potential uncertainty of the cost and benefit estimates. For more information see the section on Risks.

[2] Source: MarketingSherpa (http://www.marketingsherpa.com/1news/chartofweek-10-23-12-lp.htm) and “The State Of Retailing Online: Key Metrics And Initiatives 2014,” Forrester Research, Inc., February 12, 2014. We used a combination of reference to both ~2.5% conversion for online retail and 10% conversion for financial services to derive the conservative estimate of a 6.25% conversion rate used in the financial model for this case study.