

A Forrester Total Economic Impact™  
Study Commissioned By IBM  
September 2018

# The Total Economic Impact™ Of IBM WebSphere Liberty

Cost Savings And Business Benefits  
Enabled By WebSphere Liberty

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## ABOUT FORRESTER CONSULTING

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# Executive Summary

## Key Benefits



Improvement in developer productivity with WebSphere Liberty:

**25%**



Incremental revenue due to application improvements with WebSphere Liberty:

**\$9.5 million over three years**



Infrastructure cost savings with WebSphere Liberty:

**30% increase in density**

Organizations are increasingly looking to optimize the efficiency of their developers to drive innovation. Developers are tasked with fast experimentation, delivery of production-ready applications, and incorporation of the latest features and technologies. Organizations are also looking to modernize existing legacy applications with a focus on cloud enablement. In order to succeed in this increasingly rapid application delivery model, organizations need to provide developers with the right tools and the flexibility to use the tools they want to work with.

WebSphere Liberty is a Java Enterprise Edition (Java EE) application server, providing a low-overhead Java runtime environment that is well suited for hosting cloud applications and microservices. WebSphere Liberty is designed to be highly composable, to start fast, use less memory, and easily scale. Developers use WebSphere Liberty to quickly create cloud-native applications using Agile methodologies. WebSphere Liberty's modular architecture allows developers to minimize server size, increasing infrastructure utilization. Developers have access to popular tools and Liberty features that increase their productivity. A more modern administrator console simplifies administration of the Liberty environment.

Developers are increasingly looking for accessible, low-cost software products that are innovative and responsive in order to support the digital transformation that the business demands. Forrester has found that over 50% of the Fortune 100 use OpenStack, and over 50% of the Fortune 500 use Cloud Foundry. Additionally, 33% of global infrastructure decision makers at enterprises see adopting more open source infrastructure as a high or critical priority.<sup>1</sup> IBM's new Open Liberty server runtime has open-sourced the WebSphere Liberty architecture, providing developers with open source benefits like low-cost experimentation, customization, and access to a rapidly evolving ecosystem. Open Liberty shares the same code base as WebSphere Liberty, so organizations can begin development in Open Liberty and seamlessly move applications to WebSphere Liberty for support in production.

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 WebSphere Liberty. The purpose of this study is to provide readers with a framework to evaluate the potential financial impact of WebSphere Liberty on their organizations. To better understand the benefits, costs, and risks associated with this investment, Forrester interviewed and surveyed several customers with years of experience using WebSphere Liberty.

## Key Findings

**Quantified benefits.** The following risk-adjusted present value (PV) quantified benefits are representative of those experienced by the organizations interviewed and surveyed:

- › **WebSphere Liberty makes developers 25% more productive than previous application servers.** WebSphere Liberty's lightweight and composable runtime, integration with developer tools, and zero-migration architecture are just some of the reasons for the improvement in developer productivity. These efficiency benefits extend to application migrations as well, saving on average almost \$500,000 in developer time spent on migration efforts.



**ROI**  
**158%**



**Benefits PV**  
**\$5 million**



**NPV**  
**\$3.1 million**



**Payback**  
**12 months**

- › **On average, organizations save 1.2 administrator FTEs by migrating to WebSphere Liberty.** Organizations find that everything from creating instances to patching is simplified with WebSphere Liberty compared to prior application server environments.
- › **Improvements in application availability, performance, and innovation increase end user productivity and generate up to \$3.75 million in incremental revenue per year.** A subsection of end users saves on average 30 minutes per week due to improvement in application uptime and performance, while developers drive up to \$3.75 million in incremental revenue per year with innovative features.
- › **WebSphere Liberty's smaller footprint reduces infrastructure costs, with an average 30% improvement in density.** WebSphere Liberty is lightweight, composable, and has better throughput than other Java EE application servers, improving infrastructure utilization.

**Unquantified benefits.** The organizations experienced the following benefits, which are not quantified for this study:

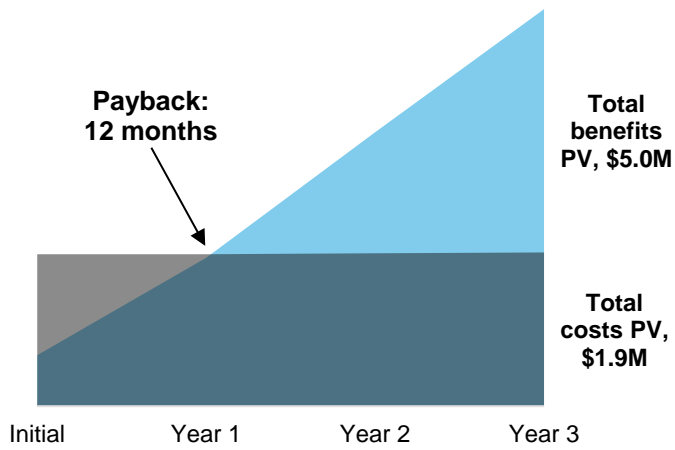
- › **Organizations are beginning to use the new Open Liberty platform in the development environment for innovation and experimentation.** Open Liberty brings the benefits of open source to WebSphere Liberty, sharing the same code base so that developers can easily begin application innovation in Open Liberty and migrate to WebSphere Liberty for support. Open Liberty provides the latest features to enable cloud-native applications, zero-cost experimentation, and access to the open source community.

**Costs.** The organizations experienced the following risk-adjusted present value (PV) costs:

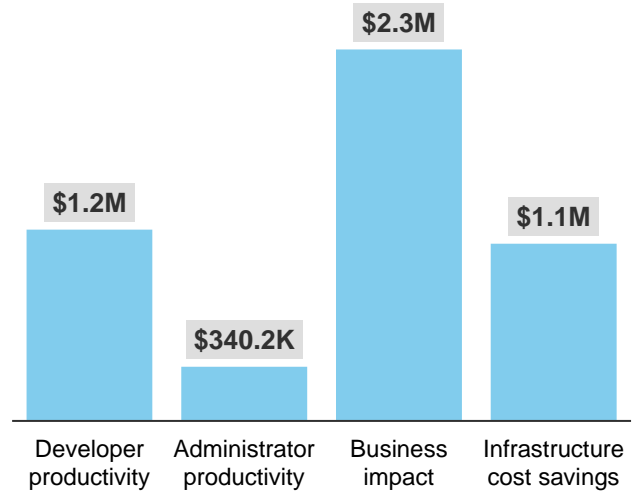
- › **WebSphere Liberty license and support costs.** Organizations only pay for WebSphere Liberty license and support costs in the production environment. There are no license or support costs for Open Liberty.
- › **Implementation and migration costs.** Organizations spend time migrating applications to WebSphere Liberty and training developers. Other costs, such as developer time, infrastructure costs, and administrator time are all more efficient with WebSphere Liberty, so these are included in the benefits section of this analysis and are not incremental costs.

Forrester's interviews with an existing customer, survey of 30 customers, and subsequent financial analysis found that an organization based on these customers' experienced benefits of \$5 million over three years versus costs of \$1.9 million, adding up to a net present value (NPV) of \$3.1 million and an ROI of 158%.

## Financial Summary



## Benefits (Three-Year)



The TEI methodology helps companies demonstrate, justify, and realize the tangible value of IT initiatives to both senior management and other key business stakeholders.

## TEI Framework And Methodology

From the information provided in the interviews and survey, Forrester has constructed a Total Economic Impact™ (TEI) framework for those organizations considering implementing IBM WebSphere Liberty.

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 WebSphere Liberty can have on an organization:



### **DUE DILIGENCE**

Interviewed IBM stakeholders and Forrester analysts to gather data relative to WebSphere Liberty.



### **CUSTOMER INTERVIEW AND SURVEY**

Conducted an in-depth phone interview with one organization and fielded an online survey to 30 organizations using WebSphere Liberty to obtain data with respect to costs, benefits, and risks.



### **COMPOSITE ORGANIZATION**

Designed a composite organization based on characteristics of the interviewed and surveyed organizations.



### **FINANCIAL MODEL FRAMEWORK**

Constructed a financial model representative of the interviews and survey using the TEI methodology and risk-adjusted the financial model based on issues and concerns of the interviewed organizations.



### **CASE STUDY**

Employed four fundamental elements of TEI in modeling IBM WebSphere Liberty's impact: 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 A for additional information on the TEI methodology.

## DISCLOSURES

Readers should be aware of the following:

This 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 ROI 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 WebSphere Liberty.

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.

IBM did not participate in the customer interview.

# The WebSphere Liberty Customer Journey

## BEFORE AND AFTER THE WEBSHERE LIBERTY INVESTMENT

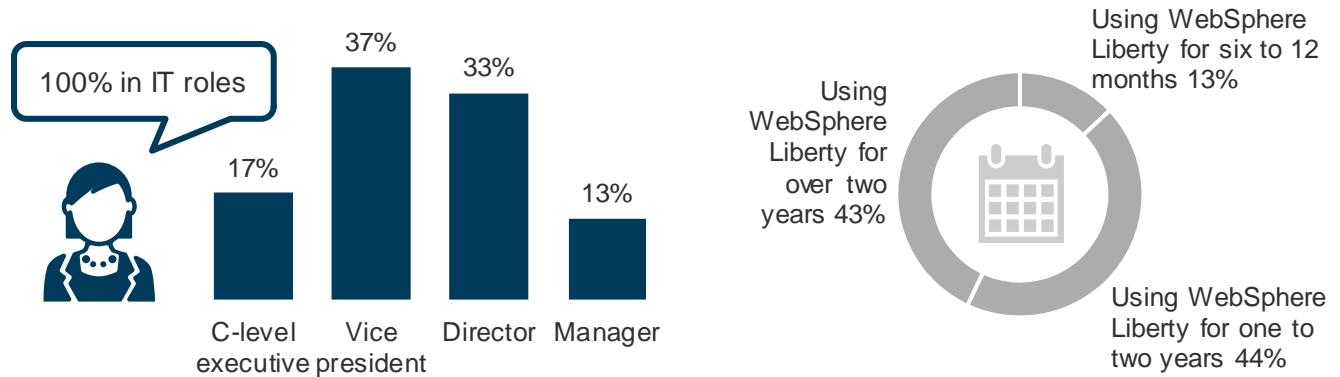
### Interviewed Organizations

For this study, Forrester conducted an interview with the following IBM WebSphere Liberty customer:

- > A multinational financial services company with over 200,000 employees.
- > The organization has been using WebSphere Liberty for over two years. Prior to using WebSphere Liberty, the organization used competitive Java EE application servers.
- > The organization completed an acquisition which required the migration of applications from a prior Java EE application server to WebSphere Liberty.

### Surveyed Organizations

For this study, Forrester surveyed 30 IT decision makers in the United States using WebSphere Liberty for over six months:



### Key Challenges

Prior to investing in WebSphere Liberty, the organizations experienced the following challenges:

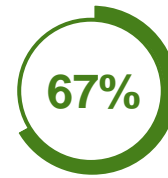
- > **Previous Java EE application server platforms were more difficult to use.** These older, commercial platforms were feature rich, but this came with significant overhead and complexity. Servers took a long time to start up, version to version migration was time consuming, and fine-grained administration resulted in more time spent on configuration and management.
- > **These previous commercial platforms were not ideally positioned to support application modernization.** Both the interviewed organization and 67% of survey respondents noted that a cloud strategy was driving their choice of application server. The organizations looked for a highly scalable server environment that could support quick provisioning and deployment, enable a more Agile development and delivery process, and provide access to the most innovative features.

“As we have developed more modern cloud infrastructure, having a big monolithic application server has had its drawbacks.”

*Vice president, financial services*



- > **Developers increasingly want to use open source programs.** The interviewed and surveyed organizations noted the link between developer productivity and business value, and these organizations are more open to allowing developers to choose which products they use for application development. Developers look to open source programs for lower startup costs and quick provisioning, rapid development cycles, flexibility, and access to and benefit from collaborating with open source communities.



Application modernization is “very” or “moderately important” for future application development.

## Key Results

The interviews and survey data revealed that key results from the WebSphere Liberty investment include:

- > **WebSphere Liberty features make developers more efficient, enabling them to spend more time on high-value work.** With WebSphere Liberty, the interviewed and surveyed organizations can quickly migrate applications to Liberty, easily provision and configure runtimes, minimize the size of the servers for fast startups, and provide developers access to innovative features like microservices, containers, and cloud connections to speed application modernization. Developers can work smarter and more efficiently using Agile methodologies with the Liberty platform, continuously delivering new application functionality based on business goals.

“The other thing we did was we went into an agile development mode, and the [WebSphere Liberty] platform was also conducive for that.”

*Vice president, financial services*



**“What features/functionality of WebSphere Liberty do you find to be most valuable?”** (Select all that apply)



Base: 30 IT decision makers using WebSphere Liberty for at least six months  
 Source: A commissioned study conducted by Forrester Consulting on behalf of IBM, August 2018

- > **WebSphere Liberty is an important component in achieving future application strategies.** Interviewed and surveyed organizations are looking for application server platforms that can support the applications of the future. Organizations need to efficiently modernize legacy applications with new functionality important to fulfilling the business strategy, while also innovating with new applications.



> **Open Liberty provides the open source benefits that developers seek while also enabling an easy migration path to the fully supported WebSphere Liberty environment.** Open Liberty has all of the benefits of WebSphere Liberty, sharing the same code base, without any of the upfront costs of a commercial product. Because the code base is shared, there is no re-work or re-testing needed when migrating applications between the two platforms. Interviewed and surveyed organizations use Open Liberty to innovate and prototype new applications, then migrate those applications to WebSphere Liberty when they need commercial support. Organizations noted the following benefits of using Open Liberty:

- Zero-cost startup for new applications.
- Improved developer interaction with the open source community.
- Improved ability to share within the organization between development teams.
- It is fully supported by IBM when a commercial WebSphere product license is applied.

“We use Open Liberty in our development space, and then we migrate to WebSphere Liberty. That’s our plan to get the microservices and other features — build and develop in Open Liberty and then integrate it with WebSphere Liberty in the production environment.”

*Vice president, financial services*



**“What additional features/functionality of Open Liberty do you find to be most valuable?”** (Select all that apply)



Base: 13 IT decision makers using Open Liberty

Source: A commissioned study conducted by Forrester Consulting on behalf of IBM, August 2018

## Composite Organization

Based on the interview and survey, Forrester constructed a TEI framework, a composite company, and an associated ROI analysis that illustrates the areas financially affected. The composite organization is representative of the company that Forrester interviewed and the 30 organizations Forrester surveyed, and it is used to present the aggregate financial analysis in the next section. The composite organization that Forrester synthesized from the customer data has the following characteristics:

**Description of composite.** The composite organization is a multinational organization with 14,000 employees and \$4.1 billion in annual revenue. The composite has 15 developers using competitive Java EE application servers. After a recent acquisition of an organization with applications on a competitive Java EE platform, the composite has 125 total applications, 25 of which are migrated to WebSphere Liberty. The composite uses several different application servers for different types of applications, but the composite is focused on its future cloud strategy, prioritizing application servers that can support future application modernization.

**Deployment characteristics.** The organization migrates 25 applications from a previous Java EE application server to WebSphere Liberty. The migration effort takes 12 months, four months faster than expected. The organization trains 15 developers to use WebSphere Liberty for ongoing application development. The organization is also beginning to use Open Liberty in its development and test environments for innovation, and it plans to expand the use of Open Liberty in the future.



## Key assumptions

25 applications on  
WebSphere Liberty

15 WebSphere Liberty  
developers

Using Open Liberty for  
experimentation

# Analysis Of Benefits

## QUANTIFIED BENEFIT DATA AS APPLIED TO THE COMPOSITE

### Total Benefits

REF.	BENEFIT	INITIAL	YEAR 1	YEAR 2	YEAR 3	TOTAL	PRESENT VALUE
Atr	Developer productivity	\$470,250	\$293,906	\$293,906	\$293,906	\$1,351,969	\$1,201,151
Btr	Administrator productivity	\$0	\$136,800	\$136,800	\$136,800	\$410,400	\$340,201
Ctr	Business impact	\$170,000	\$512,338	\$1,024,675	\$1,130,925	\$2,837,938	\$2,332,281
Dtr	Infrastructure cost savings	\$0	\$405,000	\$450,000	\$495,000	\$1,350,000	\$1,111,983
	Total benefits (risk-adjusted)	\$640,250	\$1,348,044	\$1,905,381	\$2,056,631	\$5,950,306	\$4,985,616

## Developer Productivity

With many organizations seeking to optimize developer productivity to drive innovation, it is no surprise that one of the most important benefits of WebSphere Liberty to interviewees and survey respondents is improvement in developer efficiency. Organizations achieve this efficiency both in migrating applications to WebSphere Liberty and developing applications. Features that drive this efficiency include:

- › The Liberty runtime is simple to install and configure, and the composable runtime allows developers to choose which features to include, keeping the server size as small as possible.
- › Developers might choose to keep some features during development but later realize that they actually don't need them. The "minify" option strips away those unused features that aren't needed by the application, creating the smallest package. One organization said, "I would say your code got chunked by literally about 30% to 40% because [it removed the features that are not depended upon]."
- › By eliminating unnecessary features, startup times are faster with Liberty. The smaller footprint allows organizations to pack more applications into the existing infrastructure, reducing costs.
- › Liberty integrates with popular developer tools, improving developer efficiency and allowing developers to work with the tools they like. Liberty also enables developers to easily develop new functionality using microservices, containers, and connections to cloud services.
- › Liberty applications are simple to deploy, and the debugging experience is easier, with error messages to guide developers toward the root problem.
- › The Liberty zero-migration architecture minimizes the amount of re-coding needed for Java updates so that developers can focus on innovation.

The table above shows the total of all benefits across the areas listed below, as well as present values (PVs) discounted at 10%. Over three years, the composite organization expects risk-adjusted total benefits to be a PV of almost \$5 million.

"There were a lot of Liberty features which helped the developers. They were really, really happy with how the product turned out."

*Vice president, financial services*



Organizations also achieve efficiency when migrating applications to WebSphere Liberty. One organization migrating applications due to an acquisition said: “[The time savings] could not have happened without Liberty, because we were able to get the dev team to do the DevOps to customize the applications to our standards. That development work was a lot faster. So, we were able to use Liberty to do the migration a lot quicker and a lot cheaper, putting less work on the developers and ease on the testing perspective.”

For the composite organization, Forrester made the following assumptions:

- › The composition organization completed its migration 30% faster than expected, saving \$495,000 of developer time upfront.
- › Fifteen developers use WebSphere Liberty after the migration is complete, and these developers are 25% more efficient compared to using the prior application server.
- › The average fully loaded annual developer compensation, including the value of benefits, is \$165,000.
- › Forrester conservatively assumes that 50% of this time saved is used for additional productive work.

The following risks could impact this benefit estimate:

- › Efficiency benefits are directly affected by the level of adoption of WebSphere Liberty by developers. This includes increasing familiarity with the Liberty platform over time, the use of new tools and features, and the ability to use features to achieve time savings.
- › Efficiency benefits are also dependent on the prior application server environment.

To account for these risks, Forrester adjusted this benefit downward by 5%, yielding a three-year risk-adjusted total PV of \$1.2 million.



**25% improvement in developer productivity with WebSphere Liberty**

Impact risk is the risk that the business or technology needs of the organization may not be met by the investment, resulting in lower overall total benefits. The greater the uncertainty, the wider the potential range of outcomes for benefit estimates.

### Developer Productivity: Calculation Table

REF.	METRIC	CALC.	INITIAL	YEAR 1	YEAR 2	YEAR 3
A1	Time saved on migration effort	30% efficiency	\$495,000			
A2	Number of developers using Liberty	Interview/survey		15	15	15
A3	Productivity improvement with Liberty	Interview/survey		25%	25%	25%
A4	Average fully loaded developer compensation	Assumption		\$165,000	\$165,000	\$165,000
A5	Productivity capture	Assumption		50%	50%	50%
At	Developer productivity	$A1+(A2*A3*A4*A5)$	\$495,000	\$309,375	\$309,375	\$309,375
	Risk adjustment	↓5%				
Atr	Developer productivity (risk-adjusted)		\$470,250	\$293,906	\$293,906	\$293,906

## Administrator Productivity

The interviewed and surveyed organizations also experienced an increase in administrator efficiency with WebSphere Liberty:

- › The previous commercial Java EE application server was much more difficult to set up and configure and required admin scripts and additional time spent on governance.
- › One organization said: “The incremental administration cost is also going to be down. We see a lot of administration happening on the [other Java EE application server] side of the house, especially the patching that goes on. The number of patches that come along for WebSphere Liberty is a lot less, so that reduces that effort. From an administration perspective overall, creating instances and all that, it's a little less complicated with Liberty compared to what we had.”



**1.2 administrator FTEs saved with WebSphere Liberty**

For the composite organization, Forrester made the following assumptions:

- › On average, the organization saves 1.2 WebSphere administrator FTEs compared to the prior application server environment.
- › The average fully loaded annual administrator compensation, including the value of benefits, is \$120,000.

The following risks could impact this benefit estimate:

- › Efficiency benefits are directly affected by the level of adoption and learning curve for administrators.
- › Efficiency benefits are also dependent on the prior application server environment.

To account for these risks, Forrester adjusted this benefit downward by 5%, yielding a three-year risk-adjusted total PV of \$340,000.

**Administrator Productivity: Calculation Table**

REF.	METRIC	CALC.	YEAR 1	YEAR 2	YEAR 3
B1	Administrator FTEs saved	Interview/survey	1.20	1.20	1.20
B2	Average fully loaded administrator compensation	Assumption	\$120,000	\$120,000	\$120,000
Bt	Administrator productivity	B1*B2	\$144,000	\$144,000	\$144,000
	Risk adjustment	↓5%			
Btr	Administrator productivity (risk-adjusted)		\$136,800	\$136,800	\$136,800

## Business Impact

In addition to improving efficiency for developers and administrators, WebSphere Liberty also delivered benefits to the business:

- › Fifty-three percent of survey respondents indicated that a key objective of the WebSphere Liberty investment was the “desire to improve application uptime, responsiveness, and reliability.” Ninety percent of organizations selected “improved application performance” as a benefit of the investment.
- › The interviewed organization noted that finishing their migration to WebSphere Liberty ahead of schedule allowed the organization to recognize additional revenue from their acquisition several months sooner, providing a one-time upfront revenue impact.
- › Eighty-seven percent of survey respondents indicated that WebSphere Liberty was driving application innovation at their organizations.

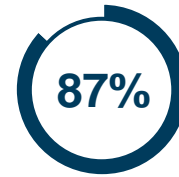
For the composite organization, Forrester made the following assumptions:

- › The improved application performance and uptime of WebSphere Liberty impacted 2,100 of the organizations’ end users. On average, each end user saved 30 minutes per week.
- › The average fully loaded hourly end-user compensation, including the value of benefits, is \$35, or \$73,000 per year. Forrester conservatively assumes that 50% of this saved time is captured for additional productive work.
- › The composite recognizes an initial \$2 million boost in revenue by completing its acquisition migration project four months ahead of schedule. The organization generates ongoing incremental revenue from WebSphere Liberty applications through improved performance and improved functionality, increasing to \$3.75 million in incremental revenue by Year 3.
- › To capture the net impact of this increase in revenue, Forrester uses a 10% operating margin.

The following risks could impact this benefit estimate:

- › The number of end users impacted by WebSphere Liberty applications, and the performance and availability of these applications in previous application server environments.
- › The adoption of WebSphere Liberty by developers, and the ability to use innovative functionality to drive incremental revenue.

To account for these risks, Forrester adjusted this benefit downward by 15%, yielding a three-year risk-adjusted total PV of \$2.3 million.



Survey respondents agree that WebSphere Liberty drives application innovation.



**\$9.5 million in incremental revenue generated over three years, resulting in almost \$1 million in incremental operating profit**

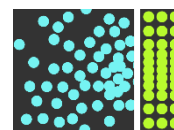
## Business Impact: Calculation Table

REF.	METRIC	CALC.	INITIAL	YEAR 1	YEAR 2	YEAR 3
C1	Number of end users impacted	Interview/survey		2,100	2,100	2,100
C2	Average time saved per week per end user (hours)	Interview/survey		0.25	0.50	0.50
C3	Average hourly fully loaded compensation for end users	Assumption		\$35	\$35	\$35
C4	Productivity capture	Assumption		50%	50%	50%
C5	Improved end-user productivity	$C1*(C2*52 \text{ weeks})*C3*C4$		\$477,750	\$955,500	\$955,500
C6	Incremental revenue	Interview/survey	\$2,000,000	\$1,250,000	\$2,500,000	\$3,750,000
C7	Average operating margin	Assumption	10%	10%	10%	10%
C8	Incremental operating profit	$C6*C7$	\$200,000	\$125,000	\$250,000	\$375,000
Ct	Business impact	$C5+C8$	\$200,000	\$602,750	\$1,205,500	\$1,330,500
	Risk adjustment	↓15%				
Ctr	Business impact (risk-adjusted)		\$170,000	\$512,338	\$1,024,675	\$1,130,925

## Infrastructure Cost Savings

WebSphere Liberty's smaller footprint improves developer productivity with faster startup times, and it also improves infrastructure utilization, reducing costs:

- › Compared to prior application server environments, WebSphere Liberty runs at a higher throughput, needing fewer resources to run workloads.
- › One organization said, "That's one of my major issues. All these [other application servers] are heavier platforms; Liberty is a lighter platform, and it is very customizable. The memory footprint is extremely low. I can get more on my cloud platform. That means I can put more applications onto the same infrastructure hardware which gives me better density."



30% better density with  
WebSphere Liberty

For the composite organization, Forrester made the following assumptions:

- › The composite achieves on average 30% more density with WebSphere Liberty compared to the previous application server.
- › With improved density, the organization saves on data center servers, space, and power. This totals to \$450,000 in infrastructure cost savings in Year 1, and goes up to \$550,000 in cost savings in Year 3.
- › Though not quantified for this analysis, WebSphere Liberty also enables organizations to right-size their application servers to further reduce costs associated with applications.

The following risks could impact this benefit estimate:

- › Infrastructure savings will be dependent on the configuration and size of prior application servers.

To account for these risks, Forrester adjusted this benefit downward by 10%, yielding a three-year risk-adjusted total PV of \$1.1 million.

### Infrastructure Cost Savings: Calculation Table

REF.	METRIC	CALC.	YEAR 1	YEAR 2	YEAR 3
D1	Infrastructure cost savings	30% density improvement	\$450,000	\$500,000	\$550,000
Dt	Infrastructure cost savings	D1	\$450,000	\$500,000	\$550,000
	Risk adjustment	↓10%			
Dtr	Infrastructure cost savings (risk-adjusted)		\$405,000	\$450,000	\$495,000

## Flexibility

The value of flexibility is clearly unique to each customer, and the measure of its value varies from organization to organization. There are multiple scenarios in which a customer might choose to implement WebSphere Liberty and later realize additional uses and business opportunities, including:

› **Expanding the use of Open Liberty to speed application innovation.** Organizations are beginning to experiment with the new Open Liberty platform, but because it is new they have not yet been able to quantify the benefits associated with its use. The interviewed organization mentioned the following in a process use case, saying, “Open Liberty is helping in a big way as we are changing our payments platform — it’s building something from the ground up, and it has the best features of all worlds, so you can have one or two payments platforms which can satisfy multiple channels. So, each of these are broken down into multiple microservices, and Open Liberty is helping with that microservices approach.” Organizations use Open Liberty for:

- Application innovation.
- Zero-cost experimentation.
- Development of applications that don’t require commercial support.

› **WebSphere Liberty’s continuous delivery model means new features are released frequently, including the recent 18.0.0.2 upgrade.** The new upgrade includes the latest Java EE 8 technologies, with WebSphere Liberty being the first vendor to pass the Java EE 8 compatibility tests. The upgrade also provides guides and sample code for the latest Java EE and Eclipse MicroProfile features. WebSphere Liberty is also expanding its support for Spring Boot applications, so developers can run Spring on WebSphere Liberty.

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

Flexibility, as defined by TEI, represents an investment in additional capacity or capability that could be turned into business benefit for a 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.



# Analysis Of Costs

## QUANTIFIED COST DATA AS APPLIED TO THE COMPOSITE

### Total Costs

REF.	COST	INITIAL	YEAR 1	YEAR 2	YEAR 3	TOTAL	PRESENT VALUE
Etr	License costs	\$73,500	\$0	\$14,700	\$14,700	\$102,900	\$96,693
Ftr	Implementation and migration costs	\$1,835,856	\$0	\$0	\$0	\$1,835,856	\$1,835,856
	Total costs (risk-adjusted)	\$1,909,356	\$0	\$14,700	\$14,700	\$1,938,756	\$1,932,549

### License Costs

For the composite organization, Forrester made the following assumptions:

- › WebSphere Liberty has license cost only in production and test environments not in the development environment.
- › The composite organization pays \$70,000 in WebSphere Liberty license costs upfront, including first year support, with an additional 20% support in years 2 and 3. Open Liberty does not have any license or support cost.

The following risks could impact this cost estimate:

- › Software license costs are variable from organization to organization and are dependent on a number of factors, including cost formula variables and vendor discounts.

To account for these risks, Forrester adjusted this cost upward by 5%, yielding a three-year risk-adjusted total PV of \$97,000.

The table above shows the total of all costs across the areas listed below, as well as present values (PVs) discounted at 10%. Over three years, the composite organization expects risk-adjusted total costs to be a PV of almost \$2 million.

Implementation risk is the risk that a proposed investment may deviate from the original or expected requirements, resulting in higher costs than anticipated. The greater the uncertainty, the wider the potential range of outcomes for cost estimates.

### License Costs: Calculation Table

REF.	METRIC	CALC.	INITIAL	YEAR 1	YEAR 2	YEAR 3
Et	License costs	Assumption	\$70,000	\$0	\$14,000	\$14,000
	Risk adjustment	↑5%				
Etr	License costs (risk-adjusted)		\$73,500	\$0	\$14,700	\$14,700

## Implementation And Migration Costs

For the composite organization, Forrester made the following assumptions:

- > It took 10 developer FTEs 12 months to migrate all 25 applications from previous Java EE application servers to WebSphere Liberty.
- > Fifteen developers use WebSphere Liberty post-migration, and each developer participated in 16 hours of training.
- > The average fully loaded annual developer compensation, including the value of benefits, is \$165,000, or \$79 hourly.
- > Developer time spent on application development, administrator time, and infrastructure costs are all net decreases compared to the previous application server environment. These are each listed as benefits as there is no incremental cost.

The following risks could impact this cost estimate:

- > Time spent on application migration will vary from organization to organization, depending on the number of employees dedicated to migrating applications and the size and complexity of applications, among other factors.
- > Organizations that use the Migration Toolkit and Transformation Advisor to move applications to WebSphere Liberty may be able to reduce the effort associated with moving applications from prior environments to WebSphere Liberty. These tools were not factored into this cost estimate.

To account for these risks, Forrester adjusted this cost upward by 10%, yielding a three-year risk-adjusted total PV of \$1.8 million.



**12 months:**  
total implementation and migration time

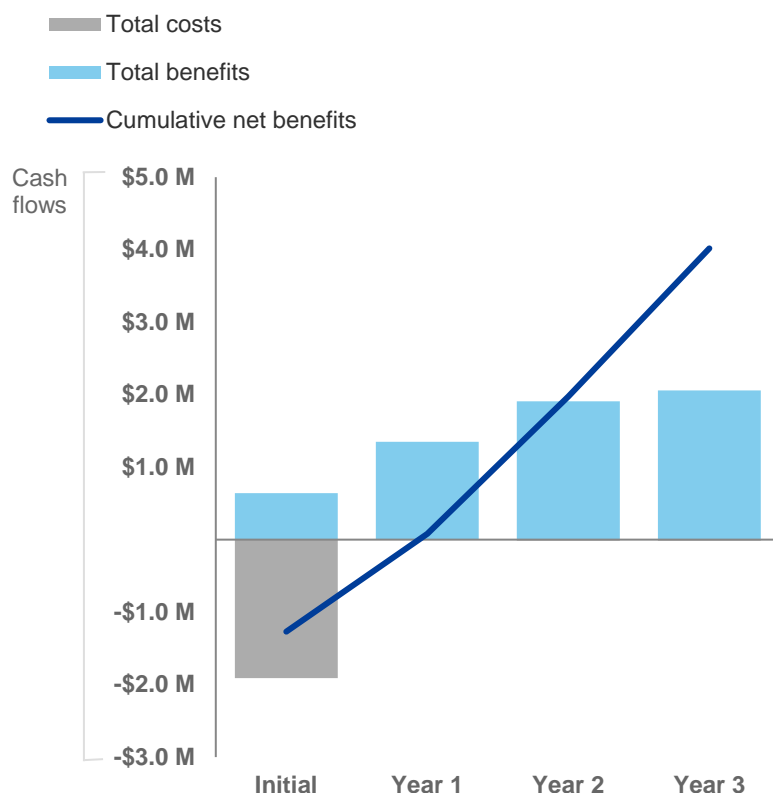
### Implementation And Migration Costs: Calculation Table

REF.	METRIC	CALC.	INITIAL	YEAR 1	YEAR 2	YEAR 3
F1	Migration effort	Interview/survey	\$1,650,000			
F2	Number of developers using Liberty	A2	15			
F3	Hours of training per developer	Interview/survey	16			
F4	Average hourly fully loaded developer compensation	165,000/2,080	\$79			
Ft	Implementation and migration costs	$F1+(F2*F3*F4)$	\$1,668,960	\$0	\$0	\$0
	Risk adjustment	↑10%				
Ftr	Implementation and migration costs (risk-adjusted)		\$1,835,856	\$0	\$0	\$0

# 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 Table (Risk-Adjusted)

	INITIAL	YEAR 1	YEAR 2	YEAR 3	TOTAL	PRESENT VALUE
Total costs	(\$1,909,356)	\$0	(\$14,700)	(\$14,700)	(\$1,938,756)	(\$1,932,549)
Total benefits	\$640,250	\$1,348,044	\$1,905,381	\$2,056,631	\$5,950,306	\$4,985,616
Net benefits	(\$1,269,106)	\$1,348,044	\$1,890,681	\$2,041,931	\$4,011,550	\$3,053,067
ROI						158%
Payback period						12 months

# IBM WebSphere Liberty: Overview

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

Liberty is a fast, dynamic, and easy-to-use runtime for Java applications; designed for lightweight cloud native applications and capable of running the most demanding enterprise workloads. Liberty's original and ongoing design approach is to be highly productive for developers and operationally robust for production, on-premises or in the cloud. WebSphere Liberty is IBM's commercially supported distribution of Liberty, provided as part of WebSphere Application Server and IBM Cloud Private. It is developed in the open source [OpenLiberty.io community](https://openliberty.io), as Open Liberty, which WebSphere Liberty extends with additional runtime features and tools.

Liberty has a modular runtime and configuration system that makes it simple to create an application deployment with just the right amount of runtime capability and no more. The runtime is provided as a set of consistent but configurable features, enabled through a simple yet flexible server.xml definition. At development time, runtime features are dynamically added and removed by editing server.xml without restarting Liberty. For delivery flexibility, configuration can be included in a single file or componentized in files with separate concerns (such as data access, security, and so on). And environment-specific variable substitution is easy to configure in a DevOps (development and operations) pipeline.

The figure below provides a view of the features that are available in Liberty – a full set of features is described at:

[https://www.ibm.com/support/knowledgecenter/en/SSEQTP\\_liberty/com.ibm.websphere.wlp.doc/ae/rwlp\\_feat.html](https://www.ibm.com/support/knowledgecenter/en/SSEQTP_liberty/com.ibm.websphere.wlp.doc/ae/rwlp_feat.html).

These are provided as part of the product install and also delivered for convenience:

- > As independently installable features through the Liberty repository:  
<https://developer.ibm.com/wasdev/downloads/>.
- > In docker container images:  
[https://hub.docker.com/\\_/websphere-liberty/](https://hub.docker.com/_/websphere-liberty/).
- > As features in maven central:  
<https://mvnrepository.com/artifact/com.ibm.websphere.appserver.features>.

Application developers can download Liberty as a 45MB archive for cloud-native applications, or as a docker image (with over 10 million Docker pulls to date) or through maven dependencies. Simple servers start in under 2 seconds and features are provided for Java EE 8 (and 7), MicroProfile and Spring Boot applications. Everything in Liberty is designed to help DevOps teams get their job done and integrate with other frameworks like Chef, Puppet, Jenkins, and UrbanCode Deploy, to name a few. For further details take a look at: <http://WASdev.net>.

Liberty is IBM's Java runtime for cloud and provided as the default Java runtime in IBM Cloud — both as a buildpack for Cloud Foundry and via a Helm chart for Kubernetes.

# Composable Liberty Features



FIGURE: Composable features of Liberty. See [Liberty Features](#) for the complete set.

# Appendix A: Total Economic Impact

Total Economic Impact is a methodology developed by Forrester Research that enhances a company's technology decision-making processes and assists vendors in communicating the value proposition of their products and services to clients. The TEI methodology helps companies demonstrate, justify, and realize the tangible value of IT initiatives to both senior management and other key business stakeholders.

## Total Economic Impact Approach



**Benefits** represent the value delivered to the business by the product. The TEI methodology places equal weight on the measure of benefits and the measure of costs, allowing for a full examination of the effect of the technology on the entire organization.



**Costs** consider all expenses necessary to deliver the proposed value, or benefits, of the product. The cost category within TEI captures incremental costs over the existing environment for ongoing costs associated with the solution.



**Flexibility** represents the strategic value that can be obtained for some future additional investment building on top of the initial investment already made. Having the ability to capture that benefit has a PV that can be estimated.



**Risks** measure the uncertainty of benefit and cost estimates given: 1) the likelihood that estimates will meet original projections and 2) the likelihood that estimates will be tracked over time. TEI risk factors are based on "triangular distribution."

The initial investment column contains costs incurred at "time 0" or at the beginning of Year 1 that are not discounted. All other cash flows are discounted using the discount rate at the end of the year. PV calculations are calculated for each total cost and benefit estimate. NPV calculations in the summary tables are the sum of the initial investment and the discounted cash flows in each year. Sums and present value calculations of the Total Benefits, Total Costs, and Cash Flow tables may not exactly add up, as some rounding may occur.



### Present value (PV)

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



### Net present value (NPV)

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



### Return on investment (ROI)

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



### Discount rate

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



### Payback period

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

## Appendix B: Endnotes

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<sup>1</sup> Source: Forrester Data Global Business Technographics® Infrastructure Survey, 2017.