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Prepared for Ardenice

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## **The Total Economic Impact™ Of the Ardenice Software-Streaming Platform, Data Center Edition**

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## Executive Summary

In May 2006, Ardence commissioned Forrester Consulting to examine the total economic impact and potential return on investment (ROI) organizations may realize by using the Ardence Software-Streaming Platform to deliver software to their servers. This study illustrates the financial impact of moving from a standard Data Center environment, where individual servers are dedicated to specific functions, to an environment where content (operating system, applications and libraries required to run a computer) is streamed to an individual server that exists in a pool of shared servers dynamically using the Ardence platform.

In conducting in-depth interviews with an existing Ardence customer, Forrester found that the use of the Software-Streaming Platform allowed an organization to reduce the overall number of servers required, lower system administration and operation costs, lower the incidence and impact of security breaches, and maximize the availability of the platform.

**Purpose:** The purpose of this study is to provide readers with a framework for evaluating the potential financial impact of using the Data Center Edition of the Ardence Software-Streaming Platform within their environment. Forrester's aim is to clearly show all calculations and assumptions used in the analysis. Readers should use this study to better understand and communicate a business case for a software-streaming platform within their own environment.

**Methodology:** Ardence selected Forrester for this project because of Forrester's industry expertise in networking, storage, and processing technologies and their effects on business, specifically in servers, data center automation, and grid computing, and because of its Total Economic Impact (TEI) methodology. TEI not only measures costs and cost reduction (areas that are typically accounted for within IT) but also weighs the enabling value of a technology in increasing the effectiveness of overall business processes.

For this study, Forrester employed four fundamental elements of TEI in analyzing the impact of implementing the Ardence platform:

1. Cost and cost reduction
2. Benefits to the entire organization
3. Risk
4. Flexibility

Given the increasing sophistication of IT investment cost analyses, Forrester's TEI methodology serves an extremely useful purpose by providing a complete picture of the total economic impact of purchase decisions. Please see Appendix B for additional information on the TEI methodology.

**Approach:** Forrester used a four-step approach for this study:

1. Forrester gathered data from existing Forrester research relative to Ardence's Software-Streaming Platform and the related market.
2. Forrester interviewed Ardence personnel to fully understand the expected value proposition for enterprises in using the Ardence platform for different business processes.

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3. Forrester conducted in-depth interviews with an organization currently using the Ardence platform in its environment.
4. Forrester constructed a financial model representative of the interviews. This model can be found in the TEI Framework section below.

**Key findings:** Forrester's study yielded three key findings:

- **ROI.** Based on interviews with an existing customer, Forrester constructed a TEI framework and an associated ROI analysis illustrating the financial impact areas. As seen in Table 1, the risk-adjusted ROI for the sample company is 138%, with a break-even point (payback period) of 0.8 years. The ROI is constructed from the incremental costs and benefits that occur by moving toward a more standardized environment.
- **Benefits.** The sample organization using the Ardence Software-Streaming Platform identified several key benefits. These included:
  - Reduction in hardware costs due to server pooling.
  - Improved administration and operational efficiencies.
  - Reduced downtime and improved continuity of service.
- **Costs.** Cost categories include licensing and maintenance costs, internal resources required for implementation, and costs for improved storage.

Table 1 illustrates the risk-adjusted cash flow for the sample organization based on data and characteristics obtained during the interview process. Forrester risk-adjusts these values to take into account the potential uncertainty that exists in estimating the costs and benefits of a technology investment. The risk-adjusted value is meant to provide a conservative estimate, incorporating any potential risk factors that may later affect the original cost and benefit estimates. If a risk-adjusted ROI still demonstrates a compelling business case, it raises confidence that the investment is likely to succeed since the risks that threaten the project have been taken into consideration and quantified. For a more in-depth explanation of risk and risk adjustments used in this study, please see the Risk section.

**Table 1: Summary Financial Results, Original And Risk-Adjusted**

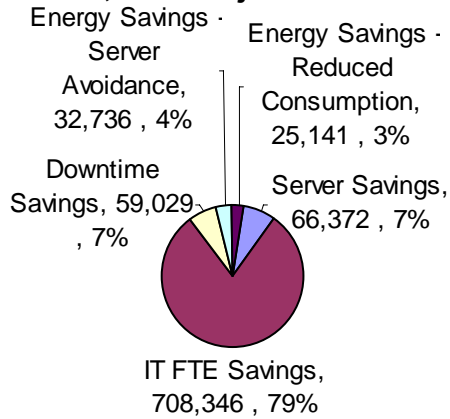
Summary Financial Results	Original Estimate	Risk-Adjusted
ROI	175%	138%
Payback period (years)	0.7	0.8
Total costs (Present Value)	(\$341,001)	(\$355,668)
Total benefits (Present Value)	\$939,196	\$846,854
Total (Net Present Value)	\$598,195	\$491,187

Source: Forrester Research, Inc.

Figures 1 and 2 illustrate the three-year breakdown of costs and benefits for the sample organization.

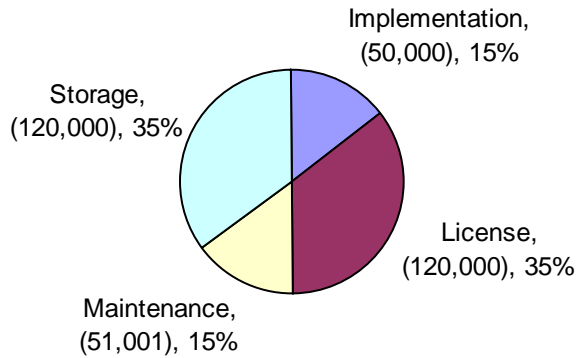
**Figure 1: Five-Year Benefits For The Sample Organization**

**Benefits, Risk Adjusted Estimates**



Source: Forrester Research, Inc.

**Figure 2: Five-Year Costs For The Sample Organization**  
**Costs, Risk Adjusted Estimates**



Source: Forrester Research, Inc.

## Disclosures

The reader should be aware of the following:

- This study was commissioned by Ardence to be delivered by the Forrester Consulting group.
- Ardence reviewed and provided feedback to Forrester, but Forrester maintained editorial control over the study and its findings. Forrester did not accept changes to the study that would contradict Forrester's findings or obscure the meaning of the study.
- The customer name for the interview was provided by Ardence.
- Forrester makes no assumptions as to the potential return on investment that other organizations will receive. Forrester strongly advises that the reader use his or her own estimates within the framework provided in the report to determine the appropriateness of an investment in the Ardence Software-Streaming Platform.
- The study is not meant to be used as a competitive product analysis.

## Software-Streaming Platform: Overview

The Data Center Edition of the Ardence Software-Streaming Platform is a solution that allows users to use servers in a highly efficient way. Servers become a pool of utility resources that can be provisioned from bare metal to production in a matter of seconds or a few minutes. This allows users to instantiate an application, such as a billing application, at night, and then repurpose it to perform a different function, like Web services, by day. This is the heart of a future state based on services-oriented architecture or software-as-a-service. Ardence streams content from network storage to servers on-demand. The servers do not need hard-disk drives and are provisioned with the desired content upon boot. The Ardence platform is software-only and the streaming technology can reduce the number of redundant and backup servers needed, as well as the amount of administrative time required to provision and manage servers.

There are risks associated with adopting a software-streaming platform, including vendor viability, which is assessing if the technology will continue to exist in spite of vendor consolidations, acquisitions, or other changes.

## Analysis

As stated in the Executive Summary, Forrester took a four-step approach to evaluate how standardizing a portion of its environment can affect an organization:

1. Internal background research using Forrester resources.
2. Interviews with Ardence personnel.
3. In-depth interviews with an organization currently using Ardence's Software-Streaming Platform, Data Center Edition.
4. Construction of a financial framework for the organization, considering the costs and benefits of using the Ardence platform.

## Interview Highlights

The customer profiled in this case study is a North American online services company, with a staff of approximately 60 people. The company is growing from a staff perspective at a rate of approximately 10% per month. The IT department is made up of six people.

The organization's data center environment consists of IBM high-density blade servers; the current number of servers is 120.

The in-depth interviews uncovered that using the Ardence platform can drive efficiencies both inside and outside of the IT organization to provide the following benefits:

- **Cost savings through server pooling.** Due to the Ardence solution, the interviewed customer was able to reduce the total number of servers needed because servers can be dynamically allocated from a pool of servers rather than pre-dedicated and overbuilt for a specific use.
- **Improved system administrator efficiency.** The customer can share administrative resources across departments, and fewer resources are required because fewer servers are required.

- **Increased availability due to reduced downtime.** The customer observed that using the Ardence platform resulted in greater system availability and the ability to rapidly address downtime issues when they did occur without taking the entire system offline.

## TEI Framework

### *Introduction*

From the information provided in the in-depth interviews, Forrester has constructed a TEI framework for those organizations that are considering adopting the Ardence platform. The objective of the framework is to identify the cost, benefit, flexibility, and risk factors that affect the investment decision.

### *Framework Assumptions*

Table 2 lists the discount rate used in both the present value (PV) and net present value (NPV) calculations and the time horizon used for the financial modeling.

**Table 2: General Assumptions**

General assumptions	Value
Discount rate	13%
Length of analysis	Three years

Source: Forrester Research, Inc.

Organizations typically use discount rates of between 8% and 16% based on their current environment. As this is a small company, a rate of 13% was used for this study. Readers are urged to consult with their finance department to determine the most appropriate discount rate to use within their own organization.

In addition to the financial assumptions used to construct the cash-flow analysis, employee burden rates are used to calculate the financial impact of internal labor. For the purpose of this analysis, fully burdened salary is a combination of base salary plus the cost of overhead (30%). In general, the cost of overhead ranges from 30% to 50% depending on the type of employee, employee location, and benefits package.

## Benefits

The first component of this analysis looks at the potential benefits associated with an organization standardizing its environment onto a single Ardence platform. The interviewed customer derived quantifiable benefits from standardization as the legacy systems in place were replaced by a single platform system. The benefits Forrester identified were in the form of:

- Cost savings through hardware cost avoidance.
- Improved operational and integration efficiencies.
- Reduced downtime and improved continuity of service.

This section illustrates the possible ways to quantify the impact of these benefits for the sample organization and is based on information collected during the interview process. Readers are advised to enter their own estimates to generate a potential return for their organization.

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Forrester assumes that benefits can begin to accrue in the first year of analysis (Year 1) to take into account the time to implement.

### Server Pooling Cost Savings

Due to the nature of the Ardence solution, fewer servers are required; many of the redundant or backup servers can be eliminated. The sample organization estimated that it would have needed an additional 37 servers to its current 120. Estimating the value of a server at \$3,000, this leads to a savings of **\$111,000**. These savings reflect only the capital investment savings in servers; further benefits due to the server consolidation will be examined as well.

**Table 3: Server Pooling Cost Savings**

Ref.		Calculation	Value
C1	Number of servers		37
C2	Server cost		\$3,000
C3	Total savings	C2 * C1	\$111,000

Source: Forrester Research, Inc.

### Improved Operational Cost Savings

Forrester believes that the organization can reduce its operations and support requirements for the environment. Using the Ardence platform greatly reduces the amount of time needed to maintain and backup servers. The sample company estimates that an additional three IT staff would be needed to maintain the environment if the Ardence platform were not being used. At an annual rate of \$100,000 per staff person, the total annual savings is **\$300,000**.

**Table 4: Pooling Cost Savings — Support**

Ref.		Calculation	Value
C4	Staff reduction		3
C5	Annual salary, IT staff		\$100,000
C6	Total savings	C4 * C5	\$300,000

Source: Forrester Research, Inc.

### Reduced Downtime Cost Savings

The structure of the Ardence platform both reduces the incidence of downtime and increases the speed with which the organization can recover. The value of these savings is estimated at **\$25,000** annually.

**Table 5: Reduced Downtime Savings**

Ref.		Calculation	Value
C7	Hours of downtime (annual)		10
C8	Cost of downtime (per hour)		\$10,000
C9	Total cost of downtime (annual)		\$100,000
C10	Percent improvement		25%
C11	Downtime savings	C9 * C10	\$25,000

Source: Forrester Research, Inc.

### Energy Savings

Energy Savings fall into two categories: the energy savings due to the server pooling and the energy savings due to lower energy consumption by the existing servers. The details of each savings are discussed below.

#### Energy Savings — Server Pooling

Fewer servers reduce the amount of energy needed significantly. The calculations below show the energy consumption of the 37 servers that the sample company would have required if they did not have the Ardenne platform. The total annual savings is **\$20,519**; the present value of this savings over a three-year period is **\$48,450**.

**Table 6A: Energy Savings: Server Pooling**

Ref.	Metric		Per Period
C12	Number of servers saved		37
C13	Kilowatts/server		0.45
C14	Total KW saved	C12 * C13	16.7
C15	Kilowatts-hours saved	C14 * 24 * 365	145,854
C16	Fixed charge per KW (annual)		\$93.60
C17	Variable charge per KWH		0.13
C18	Energy savings — server avoidance	C14*C16 +C15*C17	\$20,519

Source: Forrester Research, Inc.

#### Energy Savings — Lower Consumption

The Ardenne platform also allows the servers in the data center to run with lower energy consumption because disk drives can be physically removed and cooling characteristics thus improved. The following table lists the costs of the energy requirements in the standard situation and with the Ardenne platform. The savings between the two is **\$10,647.94** annually, or a present value of **\$25,141** over three years.

**Table 6B: Energy Savings – Lower Consumption**

<b>Ref.</b>	<b>Metric</b>	<b>Calculation</b>	<b>Total</b>
C19	Number of servers		120
C20	Kilowatts/server — before		0.45
C21	Kilowatts/server — after		0.378
C22	Total KW saved	$A1 * (A2-A3)$	8.64
C23	KWH saved	$A4 * 24 * 365$	75686.4
C24	Fixed charge per KW (annual)		\$93.60
C25	Variable charge per KWH		\$0.13
C26	Energy savings — reduced consumption	$A4*A6 + A5*A7$	\$10,647.94

**Additional Benefits**

Two additional benefits should be recognized. These benefits were not easily quantifiable, so were not included in the financial analysis; however, both were mentioned by the interviewed customer as important savings and flexibility drivers. The first is the space savings due to the server reduction; since less space is required by servers, this space can be repurposed and reduce the space needed overall.

Additionally, the Ardence platform offers the sample organization an important increased business agility. As the IBM blade servers used in the data center can scale out to match a scale out in demand, they have the ability to generate more revenue. This ability to scale out can mean that fewer customers will abandon transactions because of slow performance. Although it is difficult to quantify this benefit in a reliable manner, it has a distinct impact on the business in terms of strategic development and realized profit.

**Total Benefits**

The total benefits associated with the organization’s use of the Ardence platform are illustrated in Table 7. The point at which the sample organization received positive payback on its investment was within a year of the initial deployment.

**Table 7: Total Benefits, Non-Risk-Adjusted**

Cash Flow Analysis (Original Estimates)						
Benefits	Initial	Year 1	Year 2	Year 3	Total	Present Value
Server savings		\$111,000			\$111,000	\$98,230
IT FTE savings		\$300,000	\$300,000	\$300,000	\$900,000	\$708,346
Downtime savings		\$25,000	\$25,000	\$25,000	\$75,000	\$59,029
Energy savings - server avoidance		\$20,519	\$20,519	\$20,519	\$61,558	\$48,450
Energy savings - reduced consumption		\$10,648	\$10,648	\$10,648	\$31,944	\$25,141
<b>Total</b>		<b>\$467,167</b>	<b>\$356,167</b>	<b>\$356,167</b>	<b>\$1,179,502</b>	<b>\$939,196</b>

Source: Forrester Research, Inc.

## Costs

This section reflects the overall expenses of implementing and using the Ardence platform. This includes the costs of licensing and annual maintenance, implementation, and the costs of new hardware for storage improvements.

Costs fell into the following categories:

- Licensing costs.
- Implementation costs.
- Storage costs.
- Maintenance costs.

### Licensing Costs

The license cost of the Ardence solution is priced by server; the cost is \$1,000 per server. This cost is divided into two parts: a base cost of \$600 per server as well as a cost of \$400 per server for the High Availability (HA) option (this mode supports automatic failover for seamless processing in the event that there is a single point of failure in the Ardence Streaming Service). As the sample customer has 120 servers, the current licensing cost is **\$120,000**.

**Table 8: Licensing Costs — Primary User**

Ref.	Calculation	Value
D1	Number of servers	120
D2	Cost per server	\$1,000

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D3	Total license cost	\$120,000
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Source: Forrester Research, Inc.

**Maintenance Costs**

The annual maintenance cost of the Ardence Platform is 18% of the initial license cost. At a license cost of \$1,000/server, the license cost is then \$180 per year, per server. With a base of 120 servers, this leads to an annual maintenance cost of **\$21,600**.

**Table 9: Maintenance Costs**

Ref.		Calculation	Value
D4	Number of servers		120
D5	License cost per server		\$1000
D6	Maintenance percentage		18%
D7	Total annual cost	$D5 * D6 * D4$	\$21,600

Source: Forrester Research, Inc.

**Implementation Costs**

When the new platform is installed, there are implementation costs; in the case of the sample organization, these were internal labor costs. Forrester estimates this to be the equivalent of two full-time resources (FTEs) for a period of three months. At an annual cost of \$100,000 per resource, this gives a cost of **\$50,000**.

**Table 10: Implementation Costs**

Ref.		Calculation	Value
D8	Number of people		2
D9	Annual rate per person		\$100,000
D10	Years		.25
D11	Total implementation cost	$D8 * D9 * D10$	\$50,000

Source: Forrester Research, Inc.

**Storage Costs**

In order to fully take advantage of the Ardence benefits, the sample organization upgraded their storage capabilities. Although this is not a strictly necessary addition, the interviewed company felt that this upgrade was important to use the benefits from the Ardence platform.

**Table 11: Storage Cost**

Ref.		Calculation	Value
D12	Fibre Channel storage solution cost		\$120,000

Source: Forrester Research, Inc.

### Total Costs

The total cost for the sample organization to implement the Ardence platform is illustrated in Table 12.

**Table 12: Total Costs, Non-Risk-Adjusted**

Cash Flow Analysis (Original Estimates)						
Costs	Initial	Year 1	Year 2	Year 3	Total	Present Value
Implementation	(\$50,000)				(\$50,000)	(\$50,000)
License	(\$120,000)				(\$120,000)	(\$120,000)
Maintenance		(\$21,600)	(\$21,600)	(\$21,600)	(\$64,800)	(\$51,001)
Storage	(\$120,000)				(\$120,000)	(\$120,000)
<b>Total</b>	<b>(\$290,000)</b>	<b>(\$21,600)</b>	<b>(\$21,600)</b>	<b>(\$21,600)</b>	<b>(\$354,800)</b>	<b>(\$341,001)</b>

Source: Forrester Research, Inc.

## Risk

Forrester defines two types of investment risk associated with this analysis: implementation and impact risk. **Implementation risk** is the risk that a proposed technology investment may deviate from the original resource requirements needed to implement and integrate the investment, 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 technology investment, resulting in lower overall total benefits. The greater the uncertainty, the wider the potential range of outcomes for cost and benefit estimates. Quantitatively capturing investment risk by directly adjusting the financial estimates results in more meaningful and accurate estimates and a more accurate projection of the return on an investment.

The following general management and process risks were considered in this report:

- Cost savings and productivity gains realized by other organizations may vary from those realized by the interviewed customer. Much of the savings identified by the sample organization are due in part to its characteristics prior to the purchase of the Ardence platform, which may vary widely from organization to organization.
- The characteristics of the organization and the skill level of its employees may cause higher variability than expected. For example, an organization may not have sufficient skills to

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handle the rapid growth of its business environment. This could further reduce expected cost savings.

The following software-streaming-specific risk was considered in this report:

- Using the Ardence platform meant the sample company was putting its operating systems under the control of an external provider, something that would be difficult to recover from in the case that the product did not function in the necessary manner.

### Steps For Measuring Investment Risk

In order to calculate the final risk-adjusted estimates, Forrester applies a multistep process examining the impact of bias and variance on cost and benefit estimates.

- **Step 1: Calculate original cost and benefit estimates.** This is the initial calculation of the cost and benefit estimates without accounting for the impact of investment risk.
- **Step 2: Calculate the impact of bias for cost and benefit estimates.** To account for the impact of bias (most organizations overestimate benefits and underestimate costs), this step recalculates the original cost and benefit estimates by using the average of the original estimate (calculated in Step 1) and a low and a high estimate.
- **Step 3: Calculate variance for cost and benefit estimates.** This step measures the impact of variance on cost and benefit estimates. Variance is a measure of the possible range of outcomes for cost and benefit estimates. Higher variance implies a wider range of possible outcomes, increasing the uncertainty in cost and benefit estimates.

The three steps are used to identify and incorporate the full impact of risk as part of a technology decision. The tables below illustrate the impact of implementation and impact risk on cost and benefit estimates. For more information on the application of risk, please see Appendix D.

**Table 13: Risk Adjustment — Costs**

<b>Cash Flow Analysis (Risk-Adjusted Estimates)</b>						
<b>Costs</b>	<b>Initial</b>	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>	<b>Total</b>	<b>Present Value</b>
Implementation	(\$56,667)				(\$56,667)	(\$56,667)
License	(\$120,000)				(\$120,000)	(\$120,000)
Maintenance		(\$21,600)	(\$21,600)	(\$21,600)	(\$64,800)	(\$51,001)
Storage	(\$128,000)				(\$128,000)	(\$128,000)
<b>Total</b>	<b>(\$304,667)</b>	<b>(\$21,600)</b>	<b>(\$21,600)</b>	<b>(\$21,600)</b>	<b>(\$369,467)</b>	<b>(\$355,668)</b>

Source: Forrester Research, Inc.

Table 14: Risk Adjustment — Benefits

Cash Flow Analysis (Risk-Adjusted Estimates)						
Benefits	Initial	Year 1	Year 2	Year 3	Total	Present Value
Server savings		\$107,000			\$107,000	\$94,690
IT FTE savings		\$266,667	\$266,667	\$266,667	\$800,000	\$629,641
Downtime savings		\$23,333	\$23,333	\$23,333	\$70,000	\$55,094
Energy savings — Server avoidance		\$19,164	\$19,164	\$19,164	\$57,491	\$45,249
Energy savings — reduced consumption		\$9,394	\$9,394	\$9,394	\$28,182	\$22,181
Total		\$425,558	\$318,558	\$318,558	\$1,062,674	\$846,854

Source: Forrester Research, Inc.

## Flexibility

Flexibility, as defined by TEI, represents the value of the options created by the technology platform. When one considers an investment, one can look at both the immediate benefits and the possibility of adapting that investment to meet unanticipated or potential needs. TEI recognizes these options since they represent an additional asset that the organization has obtained as a result of implementing the basic technology platform.

These benefits could be turned into additional business benefits, depending on the future business needs of the organization. These potential benefits include taking advantage of the capability of the Ardenne platform to stream content to servers on demand without uploading new software to the servers; they can just plug and play. This allows organizations to add new servers quickly and to move assets and facilities with a minimal amount of downtime (an example that was cited by the interviewed organization.)

Due to its nature, the value of flexibility is clearly unique to each organization, and the willingness of each organization to measure the value of flexibility varied considerably from organization to organization. However, it does represent an added benefit of the Ardenne platform.

## TEI Framework: Summary

Considering the representative numbers in the financial framework constructed above, the results of the Costs, Benefits, and Risk sections can be used to determine a return on investment, net present value, and payback period. Table 14 shows the consolidation of these numbers for the sample organization.

**Table 15: Total Costs And Benefits, Non-Risk-Adjusted**

<b>Cash Flow Analysis (Original Estimates)</b>						
<b>Project Cash Flow</b>	<b>Initial</b>	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>	<b>Total</b>	<b>Present Value</b>
Total costs	(\$290,000)	(\$21,600)	(\$21,600)	(\$21,600)	(\$354,800)	(\$341,001)
Total benefits		\$467,167	\$356,167	\$356,167	\$1,179,502	\$939,196
Net savings	(\$290,000)	\$445,567	\$344,567	\$344,567	\$824,702	\$598,195
ROI						175%
Payback period						0.7 years

Source: Forrester Research, Inc.

Table 16 below shows the risk-adjusted values, applying the risk-adjustment method indicated in the Risks section and the values from Tables 13 and 14 to the numbers in Tables 15.

**Table 16: Total Costs And Benefits, Risk-Adjusted**

<b>Cash Flow Analysis (Risk-Adjusted)</b>						
<b>Project Cash Flow</b>	<b>Initial</b>	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>	<b>Total</b>	<b>Present Value</b>
Total costs	(\$304,667)	(\$21,600)	(\$21,600)	(\$21,600)	(\$369,467)	(\$355,668)
Total benefits		\$425,558	\$318,558	\$318,558	\$1,062,674	\$846,854
Net savings	(\$304,667)	\$403,958	\$296,958	\$296,958	\$693,207	\$491,187
ROI						138%
Payback period						0.8 years

Source: Forrester Research, Inc.

It is important to note that values used throughout the TEI framework are based on in-depth interviews with a sample organization. Forrester makes no assumptions as to the potential return that other organizations will receive within their own environment. Forrester strongly advises that readers use their own estimates within the framework provided in this study to determine the expected financial impact of purchasing the Ardence platform.

## Study Conclusions

Based on information collected in interviews with a current Ardence customer, Forrester found that an organization that implemented the Ardence Software-Streaming Platform, Data Center Edition, can realize significant benefits in the form of savings from server pooling, improved efficiencies, and reduced downtime into the organization's existing processes.

The in-depth interviews uncovered that using the Ardence platform can drive efficiencies both inside and outside of the IT organization to realize the following benefits:

- Reduction in hardware costs due to server pooling.
- Improved administration and operational efficiencies.
- Reduced downtime and improved availability.

The Ardence platform was installed in less than three months and created an environment that requires significantly less hardware and internal maintenance than a server environment with the same capabilities but without the Software-Streaming Platform. Overall, the Ardence solution provided a significant return on investment for the sample company. However, it should be noted that the environment at the sample organization was extremely server-intensive, with a rapid growth rate and a constant need for content on-demand. This service-oriented and hosted architecture may constitute one of the ideal environments for the Ardence platform.

The financial analysis provided in this study illustrates the process for an organization to evaluate the value proposition of Ardence's Software-Streaming Platform, Data Center Edition, in its environment. Based on information collected in in-depth interviews with an Ardence customer, Forrester calculated a three-year risk-adjusted ROI for the sample organization of 138%, with a payback after 0.8 years. All final estimates are risk-adjusted to incorporate potential uncertainty in the calculation of costs and benefits. The calculation for ROI was based on the specific incremental costs and benefits from implementing the Ardence platform.

Based on these findings, companies looking to use the Ardence Software-Streaming Platform can see the potential of significant IT and organizational benefits. Using the TEI framework, many companies may find the potential for a compelling business case to make such an investment.

## Appendix A: 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, cost, risk and flexibility.

### 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 expenses and cost reduction, leaving little room for analysis of the impact of the technology to the entire organization. The TEI methodology and resulting financial model places equal weight on the measures of benefits and costs, allowing for a full examination of the impact 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 directly back to the bottom line.

### Cost

Cost represents the investment necessary to capture the value, or benefits, of the proposed project. IT or the business units may incur costs. These may be in the form of fully burdened labor, subcontractors, or materials. Costs consider all the investment and expenses necessary to deliver the value proposed. 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.

### Risk

Risk is the third component of the TEI methodology. Risk is a measurement of the uncertainty to benefit and cost estimates contained within the investment. Uncertainty is measured two ways: the likelihood that the cost and benefit estimates will meet the original projections as well as 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 estimate. The expected value — the mean of the distribution — is used as the risk-adjusted cost or benefit number. The risk-adjusted costs and benefits are then summed to yield a complete risk-adjusted summary and ROI.

## Appendix B: Glossary

**Discount rate:** The interest rate used in cash-flow analysis to take into account the time value of money. Although the Federal Reserve Bank sets a discount rate, companies often set a separate rate based on their business and investment environment; such rates typically vary from 4% to 16%. For this analysis, Forrester assumes a yearly discount rate of 10%. Readers are urged to consult their organization 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 net present value of cash flows.

**Payback period:** The breakeven point for an investment — the point in time at which net benefits (benefits minus costs) equal initial investment or cost. Payback will vary by type of investment considered. Generally, the larger the up-front investment, the longer it will take to receive a positive payback. For example, infrastructure-based investments may see positive payback in 18 to 24 months, while upgrades to an existing application may see payback in 12 months or less.

**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 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 one through three are discounted at the end of the year using the discount rate shown in Table 2. Present value (PV) calculations are calculated for each total cost and benefit estimate. Net present value (NPV) calculations are not calculated until the summary tables and are the sum of the initial investment and the discounted cash flows in each year.

### **Example Table**

Ref.	Category	Calculation	Year 0	Year 1	Year 2	Year 3	Total

## Appendix C: Adjusting For Investment Risk (Example)

This example provides a high-level illustration of the measurement of investment risk to a single benefit estimate. The table below provides a high-level overview of the following steps.

Benefit	Step 1			Step 2		Step 3	
	Original estimate	High	Low	Bias adjustment		Risk adjusted	
				%	Value	%	Value
Benefit 1	\$2,000	\$2,400	400	80%	\$1600	87%	\$1395

### Step 1: Calculate original cost and benefit estimates

Suppose that an organization is trying to estimate the different types of benefits that might arise from a given technology investment. One potential expected benefit is savings per employee from the use of the technology. A sample benefit calculation is as follows:

Ref.	Metric	Calculation	Estimate
A1	Number of employees		200
A2	Savings per employee		\$10
A3	Total yearly estimated savings	A1 * A2	\$2,000

The \$2,000 represents the organization's original estimate of the yearly impact of the technology investment.

### Step 2: Calculate the impact of bias for cost and benefit estimates

In Step 2, we account for the impact of bias in our original cost and benefit estimates. To measure the impact of bias, we need to calculate the range of possible outcomes of our original estimate by estimating possible high/low variables around our original estimates.

Ref.	Metric	Calculation	Estimate	Low	High
A1	Number of employees per year		200		
A2	Savings per employee		\$10		
A3	Total yearly estimated savings	A1 * A2	\$2,000	\$400	\$2,400
B1	Bias adjusted estimate	$(\$2,000 + \$400 + \$2,400) / 3$	\$1,600		

In the case of our example, we have calculated our original estimate (\$2,000), our low estimate (\$400), and our high estimate (\$2,400). The unbiased estimate is calculated as the mean of the high and low estimates:  $[(\$2,000 + \$1,200 + \$2,400)/3 = \$1,600]$ . The revised estimate is now \$1,600. Reference A4 in the above table presents the revised estimate.

**Step 3: Calculate the impact of variance on cost and benefit estimates**

Once we have determined the impact of bias in our original estimates, the next step is to calculate the impact of variance. Variance measures the possible spread within our estimates. In the case of our example, the variance is based upon the low estimate (\$400), the high estimate (\$2,400), and the revised estimate (\$1,600). A wider spread would create higher uncertainty and, as a result, greater risk.

To calculate the impact of variance, we need to use the following calculations:

$$\frac{[(Lx)^2 + (x2)^2 + (Hx)^2] - (Lx) * (x2) - (Lx) * (Hx) - (x2) * (x2) * (Hx)}{18} = Var(x2)$$

Where		
Lx	Low estimate	\$400
X2	Revised (biased adjusted) estimate	\$1,600
Hx	High estimate	\$2,400

$$\frac{[(400)^2 + (1600)^2 + (2400)^2] - (400) * (1600) - (400) * (2400) - (1600) * (2400)}{18} = 168889$$

The standard deviation represents the square root of the variance:

$$\hat{\sigma}(x2) = \sqrt{Var(x2)}$$

$$\hat{\sigma}(x2) = \sqrt{168889} = 411$$

## The Total Economic Impact™ Of The Ardence Software-Streaming Platform

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The final calculation in our analysis is to create a measure for the impact of risk on the cost or benefit estimate. To do this, we use the following equation:

Risk impact: [(standard deviation of estimate)/ (unbiased estimate)] \* ½

$$\text{Risk impact} = 1 - \left[ \frac{[\partial(x2)]}{x2} \right] * \frac{1}{2}$$

$$\text{Risk impact} = 1 - \left[ \frac{411}{1600} \right] * \frac{1}{2} = 1 - 12.8\% = 87.2\%$$

The logic behind the equation for risk impact is as follows:

- We first divide the standard deviation into the unbiased estimate to get an estimate of the magnitude of the mean of the distribution to the possible spread of the distribution. This ratio allows us to compare the impact of risk multiple cost and benefit estimates by reducing it to a percentage.
- We next multiply the original ratio by ½ to measure only the likelihood of the potential downside of the estimate. Multiplying by ½ allows us to look at the part of the distribution where the likelihood that the costs will be higher than estimated (the right side of the distribution) or benefits will be lower than originally estimated (the left side of a normal distribution).

The table below illustrates the progression of the original benefit estimate to the risk-adjusted benefit estimate, accounting for the impact of variance.

Impact of bias and risk	
Original estimate	\$2,000
Revised estimate	\$1,600
Risk-adjusted estimate	\$1,395

## Appendix D: About The Project Team

### **Shaheen Zojwalla** **Consultant**

Shaheen is a consultant for Forrester's Total Economic Impact™ (TEI) products and services. The TEI methodology focuses on measuring and communicating the value of IT and business decisions and solutions, as well as providing an ROI business case based on the costs, benefits, flexibility, and risk of investments.

Shaheen came to Forrester with experience in consulting, marketing, and sales. As a product manager in strategic marketing at Teradyne, Shaheen managed several new products and helped develop the corporate strategy in the five-year company plan. Prior to joining Teradyne, she worked as a software consultant for Lucent Technologies, in the Kenan Systems group, where she implemented billing and customer care software for large telecommunications firms.

Shaheen holds a B.A. in mechanical engineering and materials science from Harvard University, an M.S. in materials science engineering from the Massachusetts Institute of Technology, and an M.B.A. from the MIT Sloan School of Management.

### **Jeffrey North** **Senior Consultant**

Jeffrey North is a senior consultant with Forrester's Total Economic Impact (TEI)™ consulting practice.

Jeff came to Forrester with consulting and operating experience, notably working with fast-growth companies. He was a founding member of the digital strategy practice at Cambridge Technology Partners, where he specialized in business value justification of technology investments and customer advocacy. As a director in the international and catalog business units at Staples, Jeff built and managed metrics and reporting programs in North America and Europe as the company experienced significant growth. He has also consulted in a business/IT capacity to retailers and life sciences companies.

Jeff holds a B.A. from St. Lawrence University and an M.B.A. with a concentration in international management and finance from Thunderbird, the Garvin School of International Management.