A Forrester Total Economic Impact™ Study

Commissioned By

CA Technologies

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The Total Economic Impact™ Of CA Technologies Service Virtualization

Cost Savings And Business Benefits Enabled By Service Virtualization

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Executive Summary

CA Technologies Service Virtualization can help improve software quality, speed up time-to-market, and reduce costs.

The costs and benefits for a composite organization of 16,500 employees, based on customer interviews, are:

- **Investment costs: $509,020.**
- **Annual costs: $415,260.**
- **Total cost savings and benefits: $6,045,537.**

CA Technologies commissioned Forrester Consulting to conduct a Total Economic Impact™ (TEI) study and examine the potential return on investment (ROI) enterprises may realize by deploying CA Service Virtualization (SV). The purpose of this study is to provide readers with a framework to evaluate the potential financial impact of CA Service Virtualization on their organization.

Forrester defines service virtualization and testing (SVT) as: testing tools that capture, model, and simulate application behavior to test the functional and nonfunctional behavior of applications in a simulated production environment.[1] To better understand the benefits, costs, and risks associated with a CA SV implementation, Forrester interviewed several customers with multiple years of experience using CA Service Virtualization.CA SV gives developers and testers the ability to create simulated software application services of production environments in order to code and test against those services without any dependency or duplication of a production environment. The result helps to speed up the software development life cycle by allowing parallel development and testing, as well as testing to take place earlier in the life cycle. This can be especially beneficial in an Agile development and DevOps environment where speed-to-market is critical in delivering new application features and updates more frequently.

Some typical cases where SV helps include:

- **Inaccessibility due to the third-party services or services running on a mainframe.** Testers and developers often do not have easy access to third-party services in order to test their application integration and end up waiting a long time before they can test.
- **Avoidance of manual repetitive development of stubs or mockups for integration testing.** Rather than waiting, developers end up wasting a lot of time creating stubs and mockups of services to quickly test in absence of the real service. The effort is often duplicated across several developers who develop the same stubs. In addition, stubs are typically inaccurate, leading to poorer quality.
- **Avoidance of duplicating production environments for testing purposes.** CA Service Virtualization reduces the need to purchase or repurpose infrastructure to test within expensive production-like environments. These environments also require resources to update configurations, as changes are made in production and for ongoing administrative tasks. Through the virtualization of production services, SV reduces the need to create and maintain these environments.

These and other inefficiencies, along with pressures to shorten software development life cycles, often result in defects and bugs making it into production, ultimately hurting the customer experience and, if severe, hurting business revenue. Overall, with SV, improvements in time-to-market and quality of applications are realized along with a reduction in costs. One IT SVP said, “There’s absolutely no disagreement that had service virtualization not been made available for that project, we would have seen a three-month delay.”

CA TECHNOLOGIES SHORTENS SOFTWARE DEVELOPMENT LIFE CYCLE

Our interviews with four existing customers and subsequent financial analysis found that a composite organization based on these interviewed organizations experienced the three-year risk-adjusted ROI, benefits, and costs shown in Figure 1.[2] See Appendix A for a description of the composite organization.

The composite organization analysis points to benefits of $6.0 million versus implementation costs of $1.5 million, adding up to a net present value (NPV) of $4.5 million.

This includes benefits of more than $1.0 million per year in early defect detection savings. With Service Virtualization, 150 defects were identified earlier in QA, equating to 24,000 hours of time savings per year.

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

Source: Forrester Research, Inc.

› **Benefits.** The composite organization experienced the following risk-adjusted benefits that represent those experienced by the interviewed companies:

- **Early defect detection in QA, leading to $1 million in average annual savings.** Our composite organization was able to identify 150 defects earlier in testing that prevented approximately 16 hours of incremental workload per defect. This not only saved time but increased the speed at which projects were being completed.
- **Development and testing efficiencies equating to $306,000 per year in savings.** Our composite organization realized approximately 440 hours of time savings during the different quality assurance (QA) processes as well as through the creation of virtual services for developers. An additional 240 hours of downtime per release was realized in not having to wait for unavailable services.
- **Testing environment infrastructure cost avoidance of $2,747,971.** The composite organization was able to avoid the purchase of hardware and software related to creating testing and training environments.

Additional benefits not quantified in this study include faster time-to-deployment and the business value related to quicker releases, reduced third-party testing and service fees, and revenue increases related to quality improvements in software and applications. These benefits were all realized by the interviewed companies, but specific quantifiable information was not available.

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

- **Software licensing fees of $426,300.** These are initial, one-time fees paid to CA Technologies for access to service virtualization. To be conservative, all pricing in this study represents the list price for CA Service Virtualization and doesn't include any potential discounting.
- **Annual maintenance costs of $85,260, or 20% of license costs per year.** This is a recurring fee paid to CA Technologies for ongoing software maintenance.
- **Professional fees of $56,320.** The composite organization required one technical expert for two months to help with integration, training, and ad hoc support**.**
- **Internal support costs of $330,000 per year.** A service virtualization center of excellence (COE) was created to help support the software, consult internally with QA and dev teams, and train new employees.
- **Power user training costs of $26,400.** One week of formal training was conducted for all power users.

Disclosures

The reader should be aware of the following:

- The study is commissioned by CA Technologies 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 CA Technologies Service Virtualization.
- CA Technologies 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.
- CA Technologies provided the customer names for the interviews but did not participate in the 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 implementing CA Technologies Service Virtualization. The objective of the framework is to identify the cost, benefit, flexibility, and risk factors that affect the investment decision, to help organizations understand how to take advantage of specific benefits, reduce costs, and improve the overall business goals of winning, serving, and retaining customers.

APPROACH AND METHODOLOGY

Forrester took a multistep approach to evaluate the impact that CA Technologies Service Virtualization can have on an organization (see Figure 2). Specifically, we:

- Interviewed CA Technologies marketing, sales, and/or consulting personnel, along with Forrester analysts, to gather data relative to service virtualization and the marketplace for service virtualization.
- Interviewed four organizations currently using CA Technologies Service Virtualization to obtain data with respect to costs, benefits, and risks.
- Designed a composite organization based on characteristics of the interviewed organizations (see Appendix A).
- 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 interviews as applied to the composite organization. The discount rate used in the PV and NPV calculations is 10%, and the time horizon used for the financial modeling is three years.
- Risk-adjusted the financial model based on issues and concerns the interviewed organizations highlighted in interviews. Risk adjustment is a key part of the TEI methodology. While interviewed organizations provided cost and benefit estimates, some categories included a broad range of responses or had a number of outside forces that might have affected the results. 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 CA Technologies Service Virtualization's service: 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 2

TEI Approach

Source: Forrester Research, Inc.

Analysis

COMPOSITE ORGANIZATION

For this study, Forrester conducted a total of four interviews with representatives from the following companies, which are CA Technologies customers based in North America:

- **An eCommerce organization with just over $1 billion in annual revenue and 3,300 employees.** This organization has deployed CA Service Virtualization mostly in QA, as it was having systems going down and confusion with third-party vendors when testing in production. Currently it operates with six concurrent power user licenses.
- **A bank with over $8 billion in annual revenue and 25,000-plus employees.** This organization has 1,500 locations throughout North America. It is using a managed service provider to operate Service Virtualization. After nine months of deploying Service Virtualization, developers are realizing the bulk of the efficiencies. With plans to expand usage into QA while rolling Agile practices, it expects to be fully benefiting from Service Virtualization in one to two years.
- **A telecommunications organization with over $20 billion in annual revenue and 36,000 employees across 10,000 locations in North America and Europe.** With an IT organization of 2,000 people, it has 30 concurrent user licenses across development, testing, and operations to support service virtualization needs.
- **A North American bank with over $29 billion in annual revenue.** This company has 85,000 employees and 2,450 locations. It utilizes CA Service Virtualization with a 300-person QA team to support their channel technologies across all lines of business.

> *"So without Service Virtualization, as highly integrated as our systems are, there is no way we could have speeded things up and moved to an Agile methodology."*
>
> ~ Senior manager, software engineering

Based on the interviews, Forrester constructed a TEI framework, a composite company, and an associated ROI analysis that illustrates the areas financially affected. The composite organization, or *The Composite Organization* that Forrester synthesized from these results, represents an organization with the following characteristics:

- It is a US-based business-to-consumer (B2C) services organization with $5 billion in annual revenue.
- Its 16,500 employees are located across 800-plus locations.
- It has 28 concurrent power user and dev/test licenses.
- It deployed CA Service Virtualization across both development and QA.
- A center of excellence that includes two highly skilled technical experts to support CA Service Virtualization adoption.

INTERVIEW HIGHLIGHTS

It's important to note that *The Composite Organization* was utilizing the waterfall methodology in the majority of its software development but was starting to integrate the Agile methodology into its digital applications projects.

With the age of the customer upon the services industry, consumers were demanding more from *The Composite Organization* than ever before. They wanted better customer support; new ways of interacting with *The Composite Organization;* and new products, capabilities, and functionality. Because of this, coupled with an increasingly competitive marketplace, *The Composite Organization* was under a lot of pressure to innovate and get to market faster. Our composite's application development and delivery VP also knew there were opportunities to:

> *"Now, with Service Virtualization, we were able to identify things that weren't going to be user friendly; we changed the way online banking looked."*
>
> ~ SVP, release and test management

- Accelerate the organization's software development life cycle (SDLC) in order to get to market faster.
- Improve the quality of the applications being developed and reduce bugs in production.
- Maximize *The Composite Organization's* ability to deploy capital and take on more projects by reducing the costs in its SDLC.
- Better support the demands from the business, including speed, flexibility, and alignment of requirements.

With these factors considered, *The Composite Organization* selected Service Virtualization for its ability to shift left QA or focus on quality from the beginning of a project while removing barriers in development and testing. Additionally, *The Composite Organization* was aware that CA Service Virtualization could help it test new functionality that would have been too cost prohibitive or inefficient to deploy historically.

The interview revealed that:

- **CA Service Virtualization shortened the software development life cycle.** The most significant benefits experienced came from developers and testers working together in order to shift left QA and capture efficiencies with using virtualized services. Testers were able to work in parallel and in a more integrated fashion with developers, using virtualized services to quickly test their code, even from an integration standpoint. Testers were able to improve efficiencies through quicker integration testing, starting much sooner than previously possible. Additionally, by not having to wait for production service availability windows, testers were able to minimize downtime and remove delays. Said one QA manager: "There were several services that wouldn't be ready for a couple of months. But we virtualized them, and we can have the service users ready long before the service has actually been developed."
- **Early detection of defects and bugs improved overall quality of application production.** With CA Service Virtualization, QA teams were able to detect defects and bugs before the applications were in production. Being able to detect these defects sooner in the QA process, testers were able to work with developers to remediate the issues before the dependencies grew, leading to hundreds of thousands of dollars in time savings. Furthermore, this time savings helped shorten the software development life cycle, enabling organizations to get to market faster with higher-quality applications.
- **CA SV helped avoid duplicating production to create testing environments and reduce infrastructure demand.** By virtualizing services, organizations no longer need to duplicate expensive production-like testing environments for QA.

> *"In order to do performance testing required, we were able to virtualize a lot of back-end systems and hardware simulation, avoiding $1.8 million."*
>
> ~ AVP, quality assurance

Additionally, they are able to cut down on the costs for accessing services on the mainframe and from third parties.

- **CA Service Virtualization helped create a more realistic and cost-effective training environment.** Taking CA Service Virtualization a step further, some of the interviewed organizations have utilized it to create a more realistic training environment for their employees. This not only reduced the support costs of updating training environments with changes from production but also created a much more lifelike training experience for employees, enabling them to provide better customer service. One software development manager said, "Now, with a virtual training environment, we get 95% to 98% of the user experience, while we save the entire infrastructure costs from the UI applications down to the bottom."

BENEFITS

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

- Early defect detection in QA.
- Development and testing efficiencies.
- Testing environment infrastructure cost avoidance.

Another important benefit mentioned by *The Composite Organization* was how CA Service Virtualization helped to enable the movement to an Agile software development methodology. When multiple Scrum teams work in parallel, no matter how accurate project planning is, it's hard to avoid dependencies that cause delay or waste time. Team A might have to wait on team B to test their finished component if team B has not yet finished coding. With SV, team A can create a virtual asset from Team's B design specs to execute testing and move on. Given the importance of speed in development and increasing releases, utilizing CA Service Virtualization to increase parallel processing played a large role in the adoption of an Agile development methodology. While the impacts of this benefit were not quantified in this study, the importance should not be overlooked.

QA Early Defect Detection Savings

The Composite Organization indicated that a key benefit from its Service Virtualization implementation was the early detection of defects and bugs in QA. Prior to Service Virtualization, 20% to 40% of defects were identified in the last stage of QA, generating greater workload in remediation than if identified earlier. In virtualizing services, testers were able to be more effective at identifying defects earlier in the process, not only moving all of the defect detection out of the final phases, but also reducing the overall amount of bugs that made it into production. As a result, *The Composite Organization* was able to improve the quality of its software and applications while reducing the costs of QA.

Following the CA Service Virtualization implementation, *The Composite Organization* identified an average of 150 defects per release sooner in QA. Including 16 hours of average remediation time savings per defect, *The Composite Organization* was saving 2,400 hours of time per release. With 10 releases per year, that equated to a total time savings equivalent to 12 full-time equivalents (FTEs). *The Composite Organization* was paying QA FTEs an average blended rate of $50 per hour or $100,000 per year fully loaded. Assuming *The Composite Organization*'s release complexity remained constant over three years, *The Composite Organization* saved $1.2 million per year. The total three-year benefit resulting from QA early defect detection was $2,984,222. Refer to Table 1 for more details.

Interviewed organizations provided a broad range in the number of QA early defects detected. There are a variety of variables, including release complexity and the number of releases an organization undertakes each year, that could have an impact on these results. To compensate, this benefit was risk-adjusted and reduced by 15%. The risk-adjusted total benefit resulting from QA early defect detection over the three years was $2,536,589. See the section on Risks for more detail.

TABLE 1
QA Early Defect Detection Savings

Ref.	Metric	Calculation	Year 1	Year 2	Year 3
A1	Releases per year		10	10	10
A2	Defects reduced per release		150	150	150
A3	Number of hours saved per early defect detection		16	16	16
A4	Total hours saved in early defect detection per year	A1*A2*A3	24,000	24,000	24,000
A5	FTE hours per year		2,000	2,000	2,000
A6	FTE's demand reduction per year	A4/A5	12	12	12
A7	FTE average rate per year		$100,000	$100,000	$100,000
At	QA early defect detection savings	A6*A7	$1,200,000	$1,200,000	$1,200,000
	Risk adjustment	🡻 15%			
Atr	**QA early defect detection savings (risk-adjusted)**		**$1,020,000**	**$1,020,000**	**$1,020,000**

Source: Forrester Research, Inc.

Development And Testing Efficiencies

The Composite Organization, through the use of CA Service Virtualization, realized efficiencies across many of the QA processes. Within integration, testing was able to start much sooner than previously possible, as testers could now work in parallel with developers. Specifically, in integration, testing set-up times that once took three days only after all the code was in place now takes 8 hours. One QA manager said: "We deploy new code every six weeks in the testing environment. But now the user could test it earlier and sooner by virtualizing services."

With CA Service Virtualization, *The Composite Organization* realized efficiencies with software developers as well. The center of excellence that was set up to support the integration of Service Virtualization also created virtual services for developers to utilize as a pre-check while developing code. With these services available to help developers understand how their code will work with the services, developers were able to write code more effectively and efficiently. See Table 3 for a detailed calculation.

Additionally, *The Composite Organization* was experiencing downtimes from dependent system services when developers and testers were ready to use them. Previously, it experienced an average of three days or 24 hours of downtime per release. By virtualizing these dependent services, the downtime experienced was essentially avoided altogether. In some cases, the unavailability of services could lead to inconveniences for customers and lost revenue. For this analysis, the impact of avoiding lost revenue was not quantified; readers are urged to evaluate this benefit based on their specific circumstances.

The Composite Organization had an average of 10 releases per year in which both 44 hours of development and testing FTE time savings and 24 hours of dependent services downtime were realized. Utilizing an average fully

burdened blended wage rate of $50 per hour, this benefit resulted in $340,000 of savings per year, or a present value of $845,530 over three years. See Table 2 for a detailed calculation.

Interviewed organizations provided a broad range of development and QA efficiencies based on differences in use cases. To compensate, this benefit was risk-adjusted and reduced by 10%. The risk-adjusted total benefit resulting from development and testing efficiencies over the three years was $760,977. See the section on Risks for more detail.

TABLE 2
Development And Testing Efficiencies

Ref.	Metric	Calculation	Year 1	Year 2	Year 3
B1	Number of hours saved in dev/QA per release		440	440	440
B2	Reduced service downtime per release		240	240	240
B3	Number of releases per year		10	10	10
B4	Average hourly rate		$50	$50	$50
Bt	Development and testing efficiencies	(B1+B2)*B3*B4	$340,000	$340,000	$340,000
	Risk adjustment	↓ 10%			
Btr	**Development and testing efficiencies (risk-adjusted)**		**$306,000**	**$306,000**	**$306,000**

Source: Forrester Research, Inc.

In order to maximize the value that CA Service Virtualization provides, readers are encouraged to deploy Service Virtualization across both QA and Development. For this analysis we quantified a small portion of developer savings that was identified by the interviewed organizations in Table 2. Table 3 illustrates a framework based on T*he Composite Organization* for readers to understand and assess the value of a more robust Service Virtualization deployment within Development. For the purposes of a more conservative analysis, the $300,000 annual reduction in developer costs was not included in the final ROI calculations.

TABLE 3
Reduction In Developer Costs

Ref.	Metric	Calculation	Year 1	Year 2	Year 3
C1	Number of development hours saved per release		600	600	600
C2	Average dev hourly rate		$50	$50	$50
C3	Releases per year		10	10	10
Ct	Reduction in developer costs	C1*C2*C3	$300,000	$300,000	$300,000

Source: Forrester Research, Inc.

Testing Environment Infrastructure Cost Avoidance

Another benefit realized by *The Composite Organization* was the avoidance of having to purchase or repurpose infrastructure to support testing production services. Prior to CA Service Virtualization, *The Composite Organization* would have to build out testing environments that mirrored production environments in order to fully test the potential impacts of its updates and applications. With CA Service Virtualization, *The Composite Organization* is now able to virtualize many of the services without having to build out duplicate environments and achieve the same results

The Composite Organization avoided having to create one new environment each year that would have cost $1.3 million in hardware, configuration, and administration. In total, over three years, *The Composite Organization* was able to save $3,232,908.

Interviewed organizations provided a broad range of cost avoidances depending on environment demands, complexity, and avoidable costs. To compensate, this benefit was risk-adjusted and reduced by 15%. The risk-adjusted total benefit resulting from QA early defect detection over the three years was $2,747,971. See the section on Risks for more detail.

TABLE 4
Testing Environment Infrastructure Cost Avoidance

Ref.	Metric	Calculation	Year 1	Year 2	Year 3
D1	Testing environment platform		1	1	1
D2	Cost per environment		$1,300,000	$1,300,000	$1,300,000
Dt	Testing environment infrastructure cost avoidance	D1*D2	$1,300,000	$1,300,000	$1,300,000
	Risk adjustment	↓ 15%			
Dtr	**Testing environment infrastructure cost avoidance (risk-adjusted)**		**$1,105,000**	**$1,105,000**	**$1,105,000**

Source: Forrester Research, Inc.

Total Benefits

Table 5 shows the total of all benefits across the four areas listed above, 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 more than $6.0 million.

TABLE 5
Total Benefits (Risk-Adjusted)

Ref.	Benefit	Year 1	Year 2	Year 3	Total	Present Value
Atr	QA early defect detection savings	$1,020,000	$1,020,000	$1,020,000	$3,060,000	$2,536,589
Btr	Development and testing efficiencies	$306,000	$306,000	$306,000	$918,000	$760,977
Dtr	Testing environment infrastructure cost avoidance	$1,105,000	$1,105,000	$1,105,000	$3,315,000	$2,747,971
	Total benefits (risk-adjusted)	**$2,431,000**	**$2,431,000**	**$2,431,000**	**$7,293,000**	**$6,045,537**

Source: Forrester Research, Inc.

COSTS

The Composite Organization experienced a number of costs associated with the Service Virtualization solution:

- Software licensing costs.
- Annual maintenance costs.
- Professional fees.
- Internal support costs.
- Internal training costs.

These represent the mix of internal and external costs experienced by the *The Composite Organization* for initial planning, implementation, and ongoing maintenance associated with CA Service Virtualization.

Please note 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 10% discount rate. For additional information, see Appendix D.

Software Licensing Costs

Software licensing costs for CA Service Virtualization were incurred during the initial implementation period; in subsequent years, an annual maintenance fee, calculated as a percentage of the initial software licensing fee, was applied. These initial costs include 28 concurrent licenses mixed between power users and dev/test users. The total initial cost for software licensing was $406,000, or about $14,500 per user.

Each year, *The Composite Organization* incurred a maintenance cost for ongoing access. The maintenance cost included 24x7 support and software upgrades developed by CA Technologies that enhance core functionalities and expand the range of industry-specific features. *The Composite Organization* incurred a 20% annual maintenance cost, applied as a percentage of its initial software licensing cost ($406,000), for an annual maintenance cost of $81,200. For an organization, annual maintenance fees may vary slightly from year to year.

Software and maintenance costs can vary from organization to organization, considering different licensing agreements, what other products may be licensed from the same vendor, and other discounts. To compensate, this cost was risk-adjusted up by 5%. The risk-adjusted cost of software and maintenance over the three years was $638,329. See the section on Risks for more detail.

TABLE 6
Software Licensing Costs

Ref.	Metric	Calculation	Initial	Year 1	Year 2	Year 3
E1	License fees per user		$14,500			
E2	Number of concurrent licenses (power users)		28			
E3	Initial software license cost	E1*E2	$406,000			
E4	Annual maintenance fee percent			20%	20%	20%
E5	Annual maintenance cost	Initial E3*E4		81,200	81,200	81,200
Et	Software license cost	E3+E5	$406,000	$81,200	$81,200	$81,200
	Risk adjustment	↑ 5%				
Etr	**Software license cost (risk-adjusted)**		**$426,300**	**$85,260**	**$85,260**	**$85,260**

Source: Forrester Research, Inc.

Professional Fees

To help with implementation and getting *The Composite Organization* familiar with CA Service Virtualization, professional services were hired at $160 per hour. The professional services were responsible for integration of software, creating training materials, training center of excellence employees on how to create virtualized services, and helping with ad hoc questions and issues as they arose. The services were acquired for a two-month period, at which time the center of excellence took over as in-house experts. The total cost of the professional services was $51,200.

As organizations may have different levels of complexity and in-house expertise, the needs of professional services can be different. For this reason, we have risk-adjusted the cost up by 10%. The risk-adjusted cost of professional fees over the three years was $56,320. See the section on Risks for more detail.

TABLE 7
Professional Fees

Ref.	Metric	Calculation	Initial	Year 1	Year 2	Year 3
F1	Number of people		1			
F2	Hourly rate per person		$160			
F3	Hours	2 months	320			
Ft	Professional fees	F1*F2*F3	$51,200	$0	$0	$0
	Risk adjustment	↑ 10%				
Ftr	**Professional fees (risk-adjusted)**		**$56,320**	**$0**	**$0**	**$0**

Source: Forrester Research, Inc.

Internal Support Costs

In order to maximize the value of CA Service Virtualization, change management and proper training were required across the organization. To support this, *The Composite Organization* created a Service Virtualization center of excellence that was tasked to help roll out virtualized services across different departments, train current and new staff on using CA Service Virtualization, and provide ad hoc support for questions or issues. The center of excellence was critical for *The Composite Organization* to drive adoption of Service Virtualization within its development and QA teams. Two highly skilled technical experts were hired as the center of excellence at a fully loaded on-shore hourly rate of $75. Over three years, the total present value of *The Composite Organization*'s center of excellence cost $746,056, or $300,000 per year.

Interviewed organizations provided a range of different formats to support CA Service Virtualization internally, including hiring an outside managed services team. Depending on the environmental demands and complexity of each organization, internal support costs may differ. To compensate, this cost was risk-adjusted and increased by 10%. The risk-adjusted total cost resulting from internal support needs over the three years was $820,661. See the section on Risks for more detail.

TABLE 8
Internal Support Costs

Ref.	Metric	Calculation	Initial	Year 1	Year 2	Year 3
G1	FTEs			2	2	2
G2	FTE hourly rate			$75	$75	$75
G3	Hours per year			2,000	2,000	2,000
Gt	Internal support costs	G1*G2*G3	$0	$300,000	$300,000	$300,000
	Risk adjustment	↑ 10%				
Gtr	**Internal support costs (risk-adjusted)**		**$0**	**$330,000**	**$330,000**	**$330,000**

Source: Forrester Research, Inc.

Internal Training Costs

To implement virtualized services across QA and development, training was required for power users. Included in the one-week training course were the two center of excellence employees and three technical experts from QA and development. These power users took on a Service Virtualization ambassador role within their areas, acting as an extension of the COE in training and implementing virtualized services. In total, the time power users spent in training equated to $24,000.

Due to the range of training provided by interviewed organizations and the levels of experience and expertise already existing internally, this cost was risk-adjusted and increased by 10%. The risk-adjusted total cost resulting from internal training was $26,400. See the section on Risks for more detail.

TABLE 9
Internal Training Costs

Ref.	Metric	Calculation	Initial	Year 1	Year 2	Year 3
H1	Number of trainees (power users)		8			
H2	Average trainee cost per hour		$75			
H3	Hours of training		40			
Ht	Internal training costs	H1*H2*H3	$24,000	$0	$0	$0
	Risk adjustment	↑ 10%				
Htr	**Internal training costs (risk-adjusted)**		**$26,400**	**$0**	**$0**	**$0**

Source: Forrester Research, Inc.

Total Costs

Table 10 shows the total of all costs as well as associated present values, discounted at 10%. Over three years, *The Composite Organization* expects total costs to total a net present value of less than $1.5 million.

TABLE 10
Total Costs (Risk-Adjusted)

Ref.	Cost Category	Initial	Year 1	Year 2	Year 3	Total	Present Value
Etr	Software license costs	$426,300	$85,260	$85,260	$85,260	$682,080	$638,329
Ftr	Professional fees	$56,320	$0	$0	$0	$56,320	$56,320
Gtr	Internal support costs	$0	$330,000	$330,000	$330,000	$990,000	$820,661
Htr	Internal training costs	$26,400	$0	$0	$0	$26,400	$26,400
	Total costs (risk-adjusted)	**$509,020**	**$415,260**	**$415,260**	**$415,260**	**$1,754,800**	**$1,541,710**

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 Service Virtualization and later realize additional uses and business opportunities. Flexibility would also be quantified when evaluated as part of a specific project, which is described in more detail in Appendix B.

For the purposes of this analysis, we have not quantified the future flexibility options gained by the interviewed companies. However, a good example of flexibility for CA Service Virtualization came from an interviewed organization that had recently gone through a large acquisition. During the integration of the newly acquired company's systems, there were three applications identified that required load testing not possible with current infrastructure. The cost to execute this testing would have been over $11 million for infrastructure alone, but with CA Service Virtualization, all host transactions were virtualized and infrastructure upgrades were avoided.

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 CA Service Virtualization 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 Service Virtualization, resulting in lower overall total benefits. The greater the uncertainty, the wider the potential range of outcomes for cost and benefit estimates.

TABLE 11
Benefit And Cost Risk Adjustments

Benefits	Adjustment
Early defect detection in QA	↓ 15%
Developer and testing efficiencies	↓ 10%
Testing infrastructure and support cost avoidance	↓ 15%
Costs	**Adjustment**
Software licensing costs	↑ 5%
Professional fees	↑ 10%
Internal support costs	↑ 10%
Internal training costs	↑ 10%

Source: Forrester Research, Inc.

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:

- **Early defect detection in QA.** This can differ from organization to organization depending on a number of variables, including the complexity of releases, the number of releases per year, and the time it takes to remediate defects.
- **Developer and testing efficiencies.** These efficiencies have a broad range of outcomes that can vary with the level of adoption within dev and QA. This benefit will grow as organizations increase their utilization of CA Service Virtualization within testing.
- **Testing infrastructure and support cost avoidance.** This has a wide range of benefits based on the size and complexity of each environment's infrastructure requirements. Additionally, the number of environments that would have been created based on the testing needs can differ from organization to organization. For these reasons, this benefit should be assessed specific to each organization's needs.

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

- **Software licensing costs.** This cost can be different for each organization based on licensing agreements, what other products may be licensed from the same vendor, and other discounts applied by CA Technologies
- **Professional fees.** These fees will vary based on the expertise of support required by organizations implementing CA Service Virtualization.
- **Internal support costs.** These costs can vary based on the structure and size of an organization. Additionally, organizations may choose to hire externally for ongoing support rather than build in-house expertise. In *The Composite Organization*, a center of excellence was created to support CA Service Virtualization. While a center of excellence is not

required by all organizations, a form of it was utilized by some organizations to maximize the value realized by CA Service Virtualization.

- **Internal training costs.** These might be higher or lower for each organization based on the organization's current level of expertise as well as the design of its training class.

In order to maximize the value of CA Service Virtualization, it is important to gain high adoption from both QA and development teams across many or all departments within an organization. This level of adoption can be difficult for organizations to achieve without gaining executive-level support and having a centralized team to aid in change management and deployment. In many cases, a cultural change is required to shift left QA and increase collaboration between developers and testers.

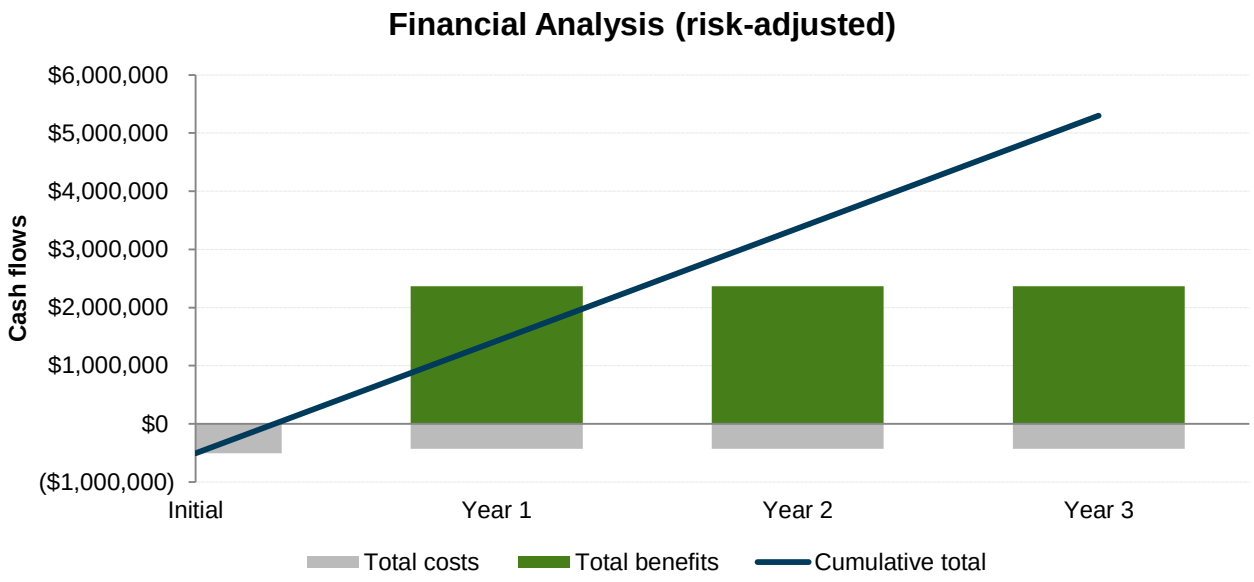
Table 11 shows the values used to adjust for risk and uncertainty in the cost and benefit estimates for *The Composite Organization*. Readers are urged to apply their own risk ranges based on their own degree of confidence in the cost and benefit estimates.

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 Composite Organization*'s investment in Service Virtualization.

Table 12 below shows the risk-adjusted ROI, NPV, and payback period values. These values are determined by applying the risk-adjustment values from Table 11 in the Risks section to the unadjusted results in each relevant cost and benefit section.

FIGURE 3
Cash Flow Chart (Risk-Adjusted)



Source: Forrester Research, Inc.

TABLE 12
Cash Flow (Risk-Adjusted)

	Initial	Year 1	Year 2	Year 3	Total	Present Value
Costs	($509,020)	($415,260)	($415,260)	($415,260)	($1,754,800)	($1,541,710)
Benefits	$0	$2,431,000	$2,431,000	$2,431,000	$7,293,000	$6,045,537
Net benefits	**($509,020)**	**$2,015,740**	**$2,015,740**	**$2,015,740**	**$5,538,200**	**$4,503,827**
ROI						**292%**
Payback period						**3 months**

Source: Forrester Research, Inc.

CA Technologies Service Virtualization: Overview

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

CA Service Virtualization simulates limited or unavailable systems across the SDLC, allowing developers, testers, and performance teams to work in parallel for faster delivery and higher application quality and reliability. CA Service Virtualization works with existing development and testing frameworks and software integration tools of choice to accelerate overall software release cycle times amidst change and complexity. It helps organizations realize Agile parallel development without constraints, increasing productivity with less manual lab configuration and test data management.

CA Service Virtualization eliminates common development and testing constraints to accelerate up to 50% higher quality application releases. CA Technologies is positioned as a large-scale global IT software player, with the solutions your organization requires in the application economy.

CA Service Virtualization offers the following key capabilities:

- Removes constraints throughout the SDLC by modeling and simulating unavailable or dependent systems.
- Enables parallel development and testing to reduce cycle times, detect defects early, and increase IT productivity.
- Reduces demand for lab infrastructure and software to avoid costs and reduce configuration effort.
- Creates live-like development environments to improve application quality.
- Leverages existing application development and integration platforms to protect IT investments.
- Accelerates time-to-market by enabling parallel software development, testing, and validation.
- Improves application quality by testing earlier in the SDLC where it is less expensive and disruptive to solve application defects.
- Reduces costs by eliminating much of the concurrent demand for development environments and pay-per-use service charges.

Appendix A: Composite Organization Description

For this TEI study, Forrester has created a composite organization named *The Composite Organization* to illustrate the quantifiable benefits and costs of implementing CA Service Virtualization. The composite company is intended to represent a US-based B2C services organization and is based on characteristics of the interviewed customers.

The composite company has 800 locations, $5 billion in annual revenue, and 16,500 employees. It also has eight power users and 20 developers and testers utilizing CA Service Virtualization. In addition, it has created a center of excellence with two highly skilled employees to help support CA Service Virtualization.

In purchasing CA Service Virtualization, the composite company has the following objectives:

- Improve the customer experience and better support customer needs.
- Accelerate the software development life cycle, increasing speed-to-market.
- Improve quality of applications and systems.
- Reduce development and testing costs.
- Enable and support Agile development practices.

FRAMEWORK ASSUMPTIONS

Table 13 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 13
Model Assumptions

Ref.	Metric	Calculation	Value
C1	Hours per week		40
C2	Weeks per year		50
C3	Hours per year (M-F, 9-5)		2,000
C4	Average onshore fully loaded power user hourly rate		$75
C5	Average blended fully loaded developer and tester hourly rate		$50

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. TEI assists technology vendors in winning, serving, and retaining customers.

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

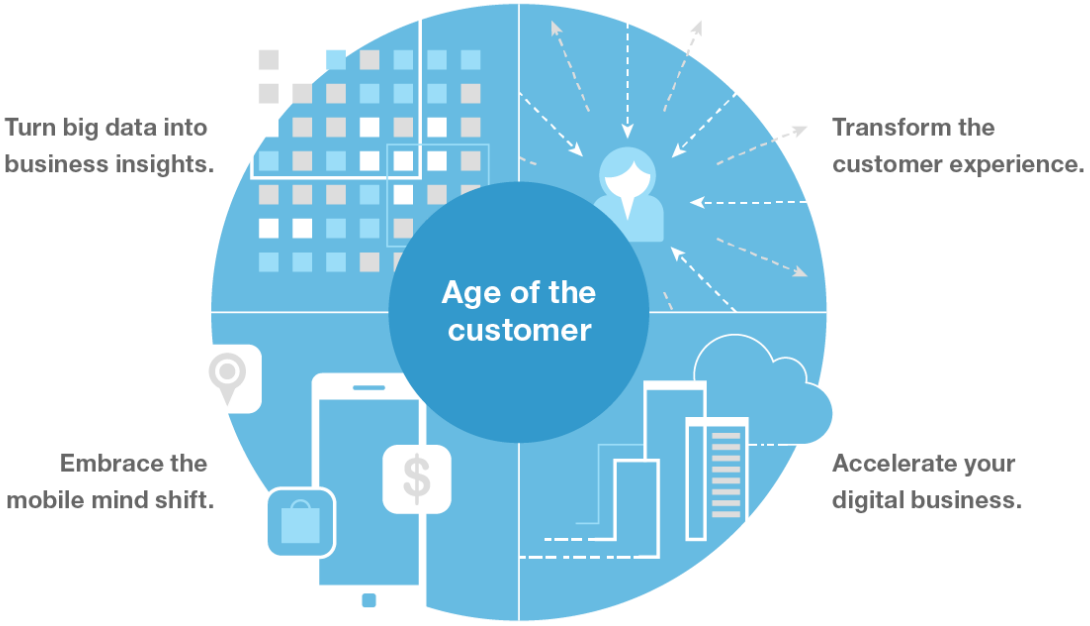
Risks measure the uncertainty of benefit and cost estimates contained within the investment. Uncertainty is measured in two ways: 1) the likelihood that the cost and benefit estimates will meet the original projections and 2) the likelihood that the estimates will be measured and tracked over time. TEI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

Appendix C: Forrester And The Age Of The Customer

Your technology-empowered customers now know more than you do about your products and services, pricing, and reputation. Your competitors can copy or undermine the moves you take to compete. The only way to win, serve, and retain customers is to become customer-obsessed.

A customer-obsessed enterprise focuses its strategy, energy, and budget on processes that enhance knowledge of and engagement with customers and prioritizes these over maintaining traditional competitive barriers.

CMOs and CIOs must work together to create this companywide transformation.



Forrester has a four-part blueprint for strategy in the age of the customer, including the following imperatives to help establish new competitive advantages:

Transform the customer experience to gain sustainable competitive advantage.

Accelerate your digital business with new technology strategies that fuel business growth.

Embrace the mobile mind shift by giving customers what they want, when they want it.

Turn (big) data into business insights through innovative analytics.

Appendix D: Glossary

Discount rate: The interest rate used in cash flow analysis to take into account the time value of money. Companies set their own 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 the 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.

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.

TABLE [EXAMPLE]
Example Table

Ref.	Metric	Calculation	Year 1	Year 2	Year 3

Source: Forrester Research, Inc.

Appendix E: Endnotes

[1] Source: "The Forrester Wave™: Service Virtualization And Testing Solutions, Q1 2014," Forrester Research, Inc., January 27, 2014.

[2] 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.