

A Forrester Total Economic
Impact™ Study

Commissioned By
Cisco Systems

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The Total Economic Impact™ Of Cisco Application-Centric Infrastructure (ACI)

FORRESTER®

Table Of Contents

Executive Summary	3
Disclosures	5
TEI Framework And Methodology	6
Analysis	7
Financial Summary	21
Cisco ACI: Overview	22
Appendix A: Total Economic Impact™ Overview.....	23
Appendix B: Forrester And The Age Of The Customer	24
Appendix C: Glossary.....	25
Appendix D: Endnotes.....	25

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Executive Summary

Cisco Systems commissioned Forrester Consulting to conduct a Total Economic Impact™ (TEI) study and examine the potential return on investment (ROI) enterprises may realize by deploying Cisco Application-Centric Infrastructure (ACI). The purpose of this study is to provide readers with a framework to evaluate the potential financial impact of ACI on their organizations, to leverage datacenter technology and related process improvement to improve application performance, IT team efficiency, and business user productivity in support of both internal and external customers.

To better understand the benefits, costs, and risks associated with an ACI implementation, Forrester interviewed several customers with experience using ACI.

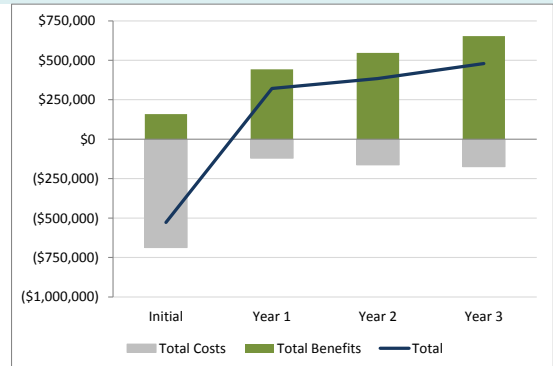
Prior to deploying ACI in the data center, customers had implemented networking hardware, typically Cisco, in a traditional manner that required hard-wiring configuration. However, this approach did not provide the ability to scale quickly and was less responsive to changing business needs. With ACI, customers were able to streamline and automate processes to build out and reconfigure data centers to meet new and changing needs. Said one interviewee: “ACI is so friendly. We finished network configuration in one day. I was amazed. With a single click we could implement all policies and load balancing. It is all very efficient.”

CISCO ACI REDUCES COST AND COMPLEXITY WHILE INCREASING BUSINESS AGILITY

Our interviews with four existing customers and subsequent financial analysis found that a composite organization (an Asian bank) based on these interviewed companies experienced the risk-adjusted ROI, benefits, and costs shown in Figure 2.¹

The composite organization achieved hard cost savings of more than \$1.8 million over the life of the study. With ACI, the level of IT effort to deploy and support data center infrastructure as well as new applications was cut dramatically.

FIGURE 1
Financial Summary — Risk-Adjusted Results



Source: Forrester Research, Inc.

FIGURE 2

Financial Summary Showing Three-Year Risk-Adjusted Results (Including Only Hard Cost Savings Benefits)

ROI:
42%

IRR:
50%

NPV:
\$811,289

Payback:
18 months

Source: Forrester Research, Inc.

- › **Hard benefits.** The composite organization experienced the following risk-adjusted benefits that represent those experienced by the interviewed companies:
 - **Initial deployment time was cut by two-thirds.** The initial deployment took 16 man-weeks of effort instead of 40. This included testing the ACI solution, moving it into production, and necessary data center migration work. The risk-adjusted total benefit in the initial period was \$62,677.
 - **Ongoing application deployment time was cut by 90%.** Deploying new applications or implementing major updates in the ACI environment is significantly faster because new hardware can be added very quickly and network configuration changes can be made almost instantaneously. The process takes 2 hours instead of a previous 72 hours per major application installation/upgrade. The risk-adjusted total benefit over three years was \$73,126.
 - **Hardware purchase costs were reduced by 20%.** Less cabling and fewer switches are required when a data center is deployed using ACI compared with a traditional hard-wiring approach. Total risk-adjusted savings for hardware purchase and maintenance were \$199,578.
 - **Time spent in ongoing networking administration activities was cut by 87%.** In the previous solution, incident management, network configuration, and network administration took 7,000 hours of effort in Year 1 of the study and increased by 20% year on year. Using ACI, this was reduced to 920 hours of effort and did not grow as quickly over the life of the study. The risk-adjusted savings over three years were \$1.5 million.
 - **ACI also provides productivity benefits to business users through better system performance, less downtime, and making network changes faster to support business needs.** This benefit was not included in the core ROI analysis since productivity gains are not counted by many organizations. One example is included as a secondary analysis, and the financial impacts are presented below. The one example quantified is 4 hours less downtime per year. The number of affected workers increases as the composite organization grows. This benefit is discounted by 50% because not all productivity gains translate into additional work completed. The benefit was further risk-adjusted, and the three-year benefit was \$2.9 million
- › **Costs.** The composite organization experienced the following risk-adjusted costs:
 - **Initially implementing and configuring ACI data center hardware took four weeks.** This time is significantly less than had an ACI approach not been used, as was discussed in the benefits above. The risk-adjusted cost during the initial period was \$46,523.
 - **Professional services were used during the initial deployment.** Professional services were used to assist with implementation and migration. The risk-adjusted cost during the initial period was \$135,000.
 - **ACI hardware and licenses were purchased and ongoing maintenance paid.** The composite organization spent \$415,000 on hardware and licenses for the initial deployment. The solution was expanded in subsequent years to support growth. 12% maintenance was paid on top of all of this. There is a corresponding benefit of 20% less hardware purchased because of reduced cabling and switch requirements. The three-year risk-adjusted costs were \$884,152.
 - **External training was used for the IT team.** In the initial period, the professional services organization also provided IT training on ACI and how to approach software-defined networking in general. The risk-adjusted cost was \$77,250.
- › **Soft benefits.** Including business user productivity gains in the financial analysis significantly improves the financial results. This is described in more detail in the Benefits section of the study. The one example included of 4 fewer hours of downtime per year results in:
 - ROI of 268%.
 - IRR of 237%.

- NPV of \$2.8 million.
- Payback period of five months.

Disclosures

The reader should be aware of the following:

- › The study is commissioned by Cisco 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 Cisco ACI.
- › Cisco 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.
- › Cisco 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 Cisco ACI. 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 goal of better serving customers.

APPROACH AND METHODOLOGY

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

- › Interviewed Cisco marketing, sales, and product personnel, along with Forrester analysts, to gather data relative to ACI and the marketplace for software-defined network (SDN) solutions.
- › Interviewed four organizations currently using Cisco ACI to obtain data with respect to costs, benefits, and risks.
- › Designed a composite organization based on characteristics of the interviewed organizations.
- › 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.
- › 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 the Cisco ACI solution: benefits, costs, flexibility, and risks.

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

FIGURE 3
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 Cisco customers based around the world:

- › A European cloud and colocation service provider.
- › A European managed hosting service provider.
- › An Asian bank.
- › A Middle Eastern university.

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 that Forrester synthesized from these results represents an organization with the following characteristics:

- › It is an Asian-headquartered bank.
- › It has offices and branches in five Asian countries, as well as global financial centers.
- › It has 12,000 employees and is growing at 5% per year.
- › Sixteen people are on the networking team out of a central IT team of 150.

INTERVIEW HIGHLIGHTS

The interviewed companies all reported similar findings in terms of why they were looking for a software-defined network solution, why they chose Cisco's solution, and the benefits realized.

Situation

The composite organization was looking to achieve several objectives, which are consistent with those reported by the interviewed companies:

- › **Support growth in a time of limited resources.** “We wanted to move from Layer 2 to IP networking. This would improve stability, allow our networking team to work in a very efficient manner, and reduce the effort to deploy applications,” indicated an interviewee.
- › **Deploy a consistent solution that could easily evolve with changing needs.** One interviewee said: “We were trying to fix a couple of problems. Firstly, we wanted a really, really good API. We were running scripts that were breaking all the time because of software upgrades. Consistency was key.”

“Before ACI, there weren’t enough people to look across the networks and manage applications. Visibility was very poor across all systems. With ACI, we have fixed this and see everything in one place.”

~ Infrastructure manager

“As a technology-driven company, we have gotten attention by saying we are doing software-defined networks. Customers have chosen us because we use ACI.”

~ Network manager

- › **Improve visibility across multiple systems.** “We did not have enough resources to look across the various networks and applications and to implement proper solutions. Our previous solution had very bad visibility,” reported an IT manager.
- › **Reduce system outages and performance problems.** One interviewee reported a “one-day outage that affected everyone at the organization.” ACI was viewed as part of a comprehensive disaster recovery (DR) solution.

Solution

The composite organization, like the interviewed companies, evaluated several options before selecting Cisco ACI. A large decision factor was that a lot of Cisco hardware was already in use. That meant it could be repurposed, and the learning curve was shorter. Additionally, the Cisco solutions all came from a single vendor, which made implementation and integration with third-party systems easier.

Results

Beyond cost savings, which are discussed throughout the study, at the highest level, the interviews revealed that Cisco ACI allows the organizations to:

- › **Reduce time-to-market and improve brand perception.** Having greater ease and speed means that the IT organization can be more responsive to changing business needs. One interviewee explained it by saying: “It is hard to put a dollar value on it. Time-to-market and adding features is the big win. We can accomplish this through greater automation.” For the interviewed hosting companies, using ACI not only allowed them to provide better and faster service to customers, but it demonstrated that they were on the cutting edge and could provide innovative solutions.
- › **Futureproof the data center.** The networks can now be reconfigured on the fly to support new deployments and changing requirements — both business and technical. The data center is also future-proofed in terms of supporting growth. One interviewee said, “We can scale at no additional [people] costs.”
- › **Provide an easy-to-use solution with visibility across multiple systems and networks.** All of the interviewed companies reported greater visibility across networks and that this enabled them to roll out better, faster solutions. “ACI brings simplicity to data centers. Having one GUI [graphical user interface] to deploy and manage everything is great. It makes no difference if it is physical or virtual from my perspective. I no longer need to manage two different worlds.” Another interviewee said: “We have a lot of visibility at the individual port level. I can see how all the traffic is flowing in a single interface. It is a very, very nice feature.”

“It was a bit of a no brainer. We needed more infrastructure, so we checked out the market for doing a classic network setup. We then asked ourselves if we should invest in the future of [software-defined networks]. Basically, it is the same price and brings so much more. There is no reason not to do it, and the APIs were for free on top of it.”

~ Networking director

BENEFITS

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

- › Reduced IT effort — data center deployment.
- › Reduced application deployment time.
- › Reduced hardware costs.
- › Reduced IT effort — ongoing administration.
- › Reduced downtime (not included in core ROI analysis).



Reduced IT Effort — Data Center Deployment

All of the interviewed companies reported significantly reduced effort to deploy and configure new hardware in the data center. This was especially important to the two companies that provide hosting services since they are always standing up new servers and networks for customers. Some specific examples across all interviewed companies include:

- › “Our company is changing. It used to take us one week to set up a new customer’s servers. Using ACI, we have reduced the entire process to one day. Along with a customer self-service portal we will be rolling out, the entire process will take minutes, literally. We are saving 30 hours per customer.”
- › “We are saving the team one to two weeks of effort in bringing up a new data center.”
- › “We would have needed to hire more people to support opening new data centers. Now we just copy what we’ve done once and drop it into a new data center.”
- › “One of the good things about ACI is there are just a couple of best-practice ways to deploy it. We don’t need to design anything. Just call Cisco and say we need a new bundle. We save at least two weeks every time we do a new deployment.”

Further examples of time and headcount savings are presented in the Reduced Application Deployment Time and Ongoing Administration Savings benefit sections later in this study.

For the composite organization, Forrester looked at the time required to deploy hardware in the newly configured data center. Details of what the buildout actually entailed are included in the Costs section of this study. For the initial deployment, the composite organization saved two weeks of design time and six weeks of installing, wiring, and configuring all of the hardware. Both efforts involved a team of three full-time equivalents (FTEs). For future deployments, 70 hours of effort were saved each time a large, new hardware addition was made to the data center.

Interviewed organizations provided a broad range of feedback on the size of their deployment and the associated cost and effort. To compensate, this benefit was risk-adjusted and reduced by 3%. The risk-adjusted total benefit over the three years was \$62,677. See the section on Risks for more detail.

TABLE 1
Reduced IT Effort — Data Center Deployment

Ref.	Metric	Calculation	Initial
A1	Number of FTEs		3
A2	Reduced design time (weeks)		2
A3	Reduced deployment time (weeks)		6
A4	Weekly fully burdened cost — IT	\$140,000/52 weeks	\$2,692.31
At	Reduced IT effort — data center deployment	$A1*(A2+A3)*A4$	\$64,615
	Risk adjustment		↓ 3%
Atr	Reduced IT effort — data center deployment (risk-adjusted)		\$62,677

Source: Forrester Research, Inc.



Reduced Application Deployment Time

In addition to realizing savings during the initial data center deployment, the interviewed companies said that the time required to deploy new applications and undertake significant updates was reduced. Less time is needed to install the necessary hardware and configure the networks to handle the new or changed applications. Specific examples provided by the interviewees include:

- › “The time it takes us to roll out new services and applications was reduced by more than 50%.”
- › “In the past, it would take a team of three people three days to put in place and configure the necessary hardware and networking components when rolling out a new application. Now we can bring up a fabric in 10 minutes. Testing is very simple, and the size of the fabric doesn’t really matter.”

For the composite organization, Forrester modeled the example of going from three days of effort down to hours. The number of new applications and major updates being implemented increases from four in the first year of the study to six in years 2 and 3.

The interviewed organizations provided a broad range of feedback on the time savings for each application deployment as well as the number of applications added and/or updated. To compensate, this benefit was risk-adjusted and reduced by 3%. The risk-adjusted total benefit over the three years was \$73,126.

TABLE 2
Reduced Application Deployment Time

Ref.	Metric	Calculation	Initial	Year 1	Year 2	Year 3
B1	Number of times new applications deployed			4	6	6
B2	Time to deploy — original (hours)	3 FTEs * 3 days * 8 hours		72	72	72
B3	Time to deploy — ACI (hours)			2	2	2
B4	Total hours saved	B1*(B2-B3)		280	420	420
B5	Hourly fully burdened cost — IT	\$140,000/2,080 hours		\$67.31	\$67.31	\$67.31
Bt	Reduced application deployment time	B4*B5		\$18,847	\$28,270	\$28,270
	Risk adjustment			↓ 3%		
Btr	Reduced application deployment time (risk-adjusted)			\$18,281	\$27,422	\$27,422

Source: Forrester Research, Inc.



Reduced Hardware Costs

Interviewed companies reported lower hardware costs for data centers deployed using ACI. This was attributed to the eliminated need for most cabling as well as more efficient use of networking equipment. Some examples shared with the interviewed companies include:

- › “There will be very large savings in the new data center. Compared to how we did cabling in the past, costs will be reduced by one-half.”
- › “The cost of adding capacity to the network environment will be reduced by 20% to 30%.”
- › “Our fabric is connected with 40GB. In an intelligent fashion, we can distribute traffic across multiple networks. If a customer generates 10GB of traffic, the network will no longer be congested because we can split it out across multiple networks. This saves us needing to add more hardware.”

For the composite organization, Forrester based the savings on the cost of the deployed hardware and maintenance described in the Costs section of the study. Additional hardware is added in each year of the study to support growth. The cost of hardware was 20% less than what would otherwise be expected. Ongoing maintenance was assumed to be 10%. The reader should review the Costs section to get a sense of size for the data center deployment.

The interviewed organizations had data centers of different sizes. The data center and associated savings included in the financial analysis more closely parallel the companies that are using ACI for internal uses rather than the two organizations that provide hosting services. To compensate, this benefit was risk-adjusted and reduced by 7%. The risk-adjusted total benefit resulting over the three years was \$199,578.

TABLE 3
Hardware Savings

Ref.	Metric	Calculation	Initial	Year 1	Year 2	Year 3
C1	Avoided hardware purchase	$G1/80\%-G1$	\$103,750	\$15,000	\$22,500	\$22,500
C2	Maintenance	$C1*10\%$ [through current year]		\$14,250	\$16,950	\$19,650
Ct	Reduced hardware costs	$C1+C2$	\$103,750	\$29,250	\$39,450	\$42,150
	Risk adjustment		↓ 7%			
Ctr	Reduced hardware costs (risk-adjusted)		\$96,488	\$27,203	\$36,689	\$39,200

Source: Forrester Research, Inc.



Reduced IT Effort — Ongoing Administration

The interviewed companies described very large savings for ongoing data center administration and networking configuration, even more so than the effort savings for deploying hardware. This includes avoiding the addition of many new hires in the future. This is attributed to greater automation and the ability to make changes with the click of a button instead of having to physically touch servers and networking equipment. Some specific examples across all interviewed companies include:

- › “Provisioning is super simple. We connect a switch to the fabric, and the fabric automatically configures it. After less than a minute the switch is connected. In the past this would have required a network engineer to connect it.”
- › “Onboarding customers is automated. Previously onboarding a standard customer would have taken 1 hour, and customers with unusual requirements would have taken days. Now we can onboard these one-off customers in a half hour because of automated scripts. We onboard 20 to 30 customers a week, so this adds up to a lot of time saved.”
- › “ACI enables us to scale without adding people. This is especially important since it is hard to find good hires. The plan is to double the business in terms of revenue over the next two years. Without ACI, we would have needed to grow the cloud and storage teams by 50% to support this growth.”
- › “We can better spread the work between different teams. We can also have lower-end teams do more of the work, which saves money.”
- › “Every time we do a software upgrade, we save 20 hours because we don’t have to touch every switch. In the old data center we did this twice a year. Now we do this more often to get the newest ACI features without adding any effort.”
- › “There has been a 30% reduction in cost and effort around incident management. The time to set up and update system policies across the network has been reduced by 80%.”

For the composite organization, Forrester compared the pre- and post-ACI time required for various activities as shared by the interviewed companies. Activities included incident management to solve problems, ongoing network configuration, and infrastructure maintenance. The effort for the pre-ACI world grew at 20% to support growth. For the ACI environment some effort levels did not increase because activities are largely automated and fully repeatable.

Interviewed organizations provided a range of feedback on the level of effort saved. To compensate, this benefit was risk-adjusted and reduced by 3%. The risk-adjusted total benefit over the three years was \$1,914,584.

TABLE 4
Reduced IT Effort — Ongoing Administration

Ref.	Metric	Calculation	Initial	Year 1	Year 2	Year 3
D1	Hours spent on incident management — original	Growing 20% annually		200	240	288
D2	Hours spent on network configuration — original	80 hours * 20 instances [growing 20% annually]		1,600	1,920	2,304
D3	Hours spent on infrastructure maintenance — original	100 hours * 52 weeks [growing 20% annually]		5,200	6,240	7,488
D4	Total annual hours — original	C1+C2+C3		7,000	8,400	10,080
D5	Hours spent on incident management — with ACI			40	48	58
D6	Hours spent on network configuration — with ACI	18 hours * 20 instances [growing 20% annually]		360	432	518
D7	Hours spent on infrastructure maintenance — with ACI	10 hours * 52 weeks		520	520	520
D8	Total annual hours — with ACI	C5+C6+C7		920	1,000	1,096
D9	Total hours saved	C4-C8		6,080	7,400	8,984
D10	Fully burdened hourly cost	\$140,000/2,080 hours		\$67.31	\$67.31	\$67.31
Dt	Reduced IT effort — ongoing administration	C9*C10		\$409,245	\$498,094	\$604,713
	Risk adjustment			↓ 3%		
Dtr	Reduced IT effort — ongoing administration (risk-adjusted)			\$396,967	\$483,151	\$586,572

Source: Forrester Research, Inc.

Total Quantified Benefits

Table 5 shows the total of all quantified hard benefits across the three areas listed above, as well as present values (PVs) discounted at 10%.

TABLE 5
Total Quantified Benefits (Risk-Adjusted)

Ref.	Benefit	Initial	Year 1	Year 2	Year 3	Total	Present Value
Atr	Reduced IT effort — data center deployment	\$62,677				\$62,677	\$62,677
Btr	Reduced application deployment time		\$18,281	\$27,422	\$27,422	\$73,126	\$59,885
Ctr	Reduced hardware costs	\$96,488	\$27,203	\$36,689	\$39,200	\$199,578	\$180,989
Dtr	Reduced IT effort — ongoing administration		\$396,967	\$483,151	\$586,572	\$1,466,690	\$1,200,878
	Total benefits	\$159,164	\$442,451	\$547,262	\$653,193	\$1,802,071	\$1,504,429

Source: Forrester Research, Inc.



A Soft Benefit/User Productivity Benefit Example — Reduced Downtime

The impact to the business organization from improved system performance, better time-to-market, and reduced downtime is potentially much greater than the cost savings described above. This benefit was left out of the core ROI analysis because it can be harder or impossible to quantify, and because it may be a soft savings that readers do not want to include in their business case.

To demonstrate this potential impact on the business case, Forrester looked at one area — reduced downtime. This is based on an event that occurred at one of the interviewed companies as well as general sentiment across many of the interviewed companies. This delivers additional benefits without additional costs.

Some of what Forrester heard includes:

- › “We have fewer instances of our APIs breaking after software updates. This was a common problem before ACI.”
- › “If we could avoid one big networking incident per year, that would be a very good thing.”
- › “Before ACI, we had one big outage or significant network performance problem a year.”
- › “We are delivering greater availability. A key focus for us is not being down for a day. That had a huge impact.”

For the composite organization, Forrester included 4 hours less downtime per year either because of broken APIs after a software update or a major outage attributed to various factors. This affected 10,000 users out of the 12,000 employees in Year 1 of the study. The number of affected users grows by 5% per year, the same as the increase in overall employees. Because not all productivity gains translate into additional work accomplished, this benefit was discounted by 50%.

To be very conservative, this benefit was also risk-adjusted and reduced by 13%. The risk-adjusted total benefit over the three years was \$2,900,653.

TABLE 6
Reduced Downtime

Ref.	Metric	Calculation	Initial	Year 1	Year 2	Year 3
E1	Number of affected workers	[Growing 5% per year]		10,000	10,500	11,025
E2	Number of hours reduced downtime			4	4	4
E3	Fully burdened cost (hourly)	\$110,000/2,080 hours		\$52.88	\$52.88	\$52.88
E4	Total increased productivity	$E1 * E2 * E3$		\$2,115,200	\$2,220,960	\$2,332,008
E5	Percentage of benefit realized			50%	50%	50%
Et	Reduced downtime	$E4 * E5$		\$1,057,600	\$1,110,480	\$1,166,004
	Risk adjustment			↓ 13%		
Etr	Reduced downtime (risk-adjusted)			\$920,112	\$966,118	\$1,014,423

Source: Forrester Research, Inc.

Including user productivity gains from better application performance and/or less downtime significantly improves the business case for ACI and results in the following:

- › ROI of 268%.
- › IRR of 237%.
- › NPV of \$2.8 million.
- › Payback period of 5 months.

Readers are encouraged to think about ways that improved network performance and reliability can be a benefit to their organization and possibly include it in the analysis.

COSTS

The composite organization experienced a number of costs associated with the ACI solution:

- › Internal implementation labor.
- › Professional services.
- › ACI solution.
- › Training fees.

These represent the mix of internal and external costs experienced by the composite organization for initial planning, implementation, and ongoing maintenance associated with the solution.



Internal Implementation Labor

This is the corresponding piece to the labor savings benefit discussed earlier. All of the interviewed companies said that deploying ACI was very straightforward. One company said, “We were not expecting to be able to do the deployment so efficiently.” The design piece was basically eliminated. For the hosting companies interviewed, the most time-consuming piece was migrating all of their customers over, not the actual installation and configuration. One interviewee said that “the test phase was just two weeks long. We then moved production onto this environment without making any changes.”

For the composite organization, four FTEs worked for four weeks on the project. This included testing, moving into production, and migrations. Ongoing operation costs are shown as a reduction in the ongoing administration benefit in order to net out the effort for the composite organization.

This was risk-adjusted up by 8% since the level of effort varied across interviewed organizations. The risk-adjusted cost in the initial period was \$46,523.

TABLE 7
Internal Implementation Labor

Ref.	Metric	Calculation	Initial	Year 1	Year 2	Year 3
F1	Number of weeks		4			
F2	Number of FTEs		4			
F3	Fully burdened labor cost (weekly)	\$140,000/52 weeks	\$2,692			
Ft	Internal implementation costs	$F1 \cdot F2 \cdot F3$	\$43,077			
	Risk adjustment		↑ 8%			
Ftr	Internal implementation labor (risk-adjusted)		\$46,523			

Source: Forrester Research, Inc.



Professional Services

Three of the four interviewed companies used professional services during the initial phase. This was to help stand up and configure ACI and assist with best practices regarding migrations. This ranged from \$40,000 to \$150,000. IT departments became self-sufficient very quickly, and subsequent professional services were not needed.

Forrester included \$125,000 in professional services during the initial period. This was risk-adjusted up by 8%. The risk-adjusted cost during the initial period was \$135,000.

TABLE 8
Professional Services

Ref.	Metric	Calculation	Initial	Year 1	Year 2	Year 3
G1	Professional service fees		\$125,000			
Gt	Professional services	=G1	\$125,000			
	Risk adjustment		↑ 8%			
Gtr	Professional services (risk-adjusted)		\$135,000			

Source: Forrester Research, Inc.



ACI Solution

ACI solution costs vary depending on the size of the ACI deployment and the components used.. Among the interviewed companies, the approach to adding servers varied from blade servers to all-in-one appliances. The initial Cisco solution component for the composite organization consisted of:

- › Two fixed ACI spines (9336).
- › Four ACI leafs (9396) including software licenses.
- › Three APIC controllers.
- › One ASR 1004 edge router.
- › One ASA5585 firewall.

In addition to the initial deployment, hardware was added over the life of the study to support growth. For this study, Forrester used list prices for North America, and maintenance was included at 12%. Actual prices will vary depending on other Cisco solutions already in use and any negotiated enterprise discounts. Readers are encouraged to work with their Cisco account representative to understand the scope and cost of the ACI solution that best fits their needs.

The composite organization paid \$415,000 for the ACI solution. An additional \$240,000 was spent in subsequent years to grow the deployment. A 12% maintenance fee was paid on top. This was risk-adjusted up by 3%. The risk-adjusted cost was \$884,152.

TABLE 9
ACI Solution

Ref.	Metric	Calculation	Initial	Year 1	Year 2	Year 3
H1	ACI solution		\$415,000	\$60,000	\$90,000	\$90,000
H2	Maintenance	H1 [through current year]*12%		\$57,000	\$67,800	\$78,600
Ht	ACI solution	H1+H2	\$415,000	\$117,000	\$157,800	\$168,600
	Risk adjustment		↑ 3%			
Htr	ACI solution (risk-adjusted)		\$427,500	\$120,510	\$162,534	\$173,658

Source: Forrester Research, Inc.



Training Fees

External training was used by the two interviewed organizations that are using ACI for internal purposes. Training was not used by the two hosting companies because of the skills they already had in-house. For the composite organization, \$75,000 of training was included during the initial period for the IT team. This was primarily to learn how to use ACI. This was risk-adjusted up by 3%. The risk-adjusted cost during the initial period was \$77,250.

TABLE 10
Training Fees

Ref.	Metric	Calculation	Initial	Year 1	Year 2	Year 3
I1	Training fees		\$75,000			
It	Training fees	=I1	\$75,000			
	Risk adjustment		↑ 3%			
Jtr	Training fees (risk-adjusted)		\$77,250			

Source: Forrester Research, Inc.

Total Costs

Table 11 shows the total of all costs as well as associated present values, discounted at 10%.

TABLE 11
Total Costs (Risk-Adjusted)

Ref.	Cost	Initial	Year 1	Year 2	Year 3	Total	Present Value
Ftr	Internal implementation labor	\$46,523	\$0	\$0	\$0	\$46,523	\$46,523
Gtr	Professional services	\$135,000	\$0	\$0	\$0	\$135,000	\$135,000
Htr	ACI solution	\$427,450	\$120,510	\$162,534	\$173,658	\$884,152	\$801,802
Itr	Training fees	\$77,250	\$0	\$0	\$0	\$77,250	\$77,250
	Total costs	\$686,223	\$120,510	\$162,534	\$173,658	\$1,142,925	\$1,060,575

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 ACI and later realize additional uses and business opportunities. Flexibility would also be quantified when evaluated as part of a specific project (described in more detail in Appendix A).

The composite organization is looking to increase automation in the data center that has deployed ACI. It is looking to further streamline “everything from operations to deployments to inserting a new switch into the network, and to rolling out policies.” It will also continue to roll out ACI at other data centers and when new data center hardware is installed. None of these future benefits were included in the financial analysis.

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

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

Table 12 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.

TABLE 12
Benefit And Cost Risk Adjustments

Benefits	Adjustment
Reduced IT effort — data center deployment	↓ 3%
Reduced application deployment time	↓ 3%
Reduced hardware costs	↓ 7%
Reduced IT effort — ongoing administration	↓ 3%
Reduced downtime	↓ 13%
Costs	Adjustment
Internal implementation labor	↑ 8%
Professional services	↑ 8%
ACI solution	↑ 3%
Training fees	↑ 3%

Source: Forrester Research, Inc.

Financial Summary

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

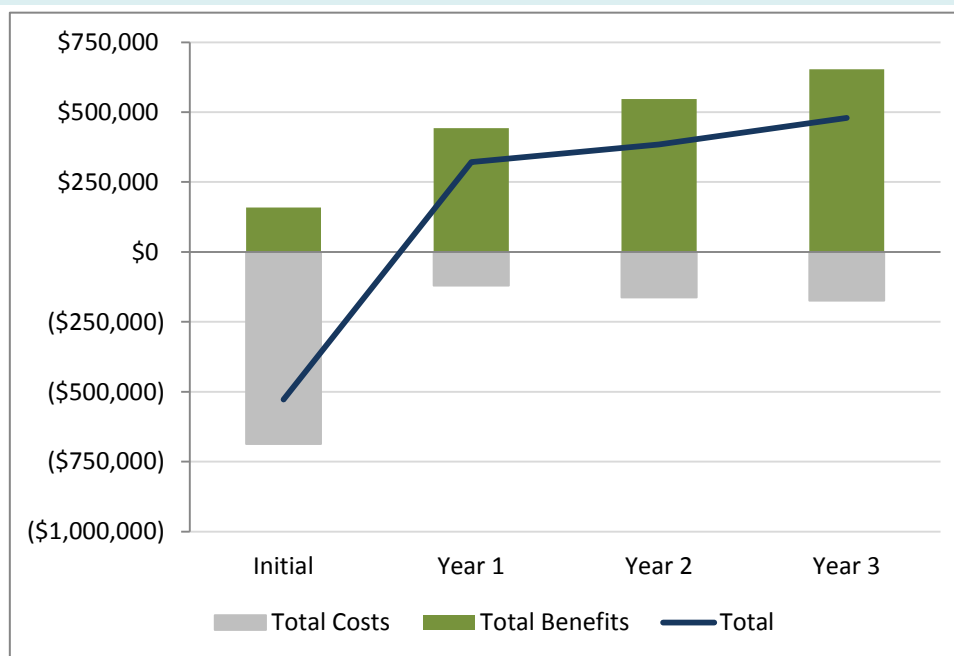
Table 13 below shows the risk-adjusted ROI, NPV, and payback period values. This excludes the productivity benefit from reduced downtime discussed earlier in the study. These values are determined by applying the risk-adjustment values from Table 12 in the Risks section to the unadjusted results in each relevant cost and benefit section.

TABLE 13
Cash Flow (Risk-Adjusted)

	Initial	Year 1	Year 2	Year 3	Total	Present Value
Costs	(\$686,223)	(\$120,510)	(\$162,534)	(\$173,658)	(\$1,142,925)	(\$1,060,575)
Benefits	\$159,164	\$442,451	\$547,262	\$653,193	\$1,802,071	\$1,504,429
Net benefits	(\$527,059)	\$321,941	\$384,728	\$479,535	\$659,146	\$443,854
ROI	42%					
IRR	50%					
Payback period	18 months					

Source: Forrester Research, Inc.

FIGURE 4
Cash Flow Chart (Risk-Adjusted)



Source: Forrester Research, Inc.

Cisco ACI: Overview

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

Cisco ACI is a comprehensive SDN architecture. This policy-based automation solution supports a business-relevant application policy language, greater scalability through a distributed enforcement system, and greater network visibility. These benefits are achieved through the integration of physical and virtual environments under one policy model for networks, servers, storage, services, and security.

Through Cisco ACI, customers are reducing application deployment times from weeks to minutes. Cisco ACI also dramatically improves IT alignment with business objectives and policy requirements.

Cisco ACI is built on:

- › The Application-Centric Policy (based on the Cisco Application Policy Infrastructure Controller, or APIC).
- › The Cisco ACI Fabric (based on Cisco Nexus 9000 Series Switches and the Cisco Application Virtual Switch [AVS])
- › The Cisco ACI Partner Ecosystem.

ACI provides a network that is deployed, monitored, and managed in a way that benefits different teams in the IT organization, including SDN network, cloud and DevOps, and security teams. It supports rapid application change by reducing complexity with a common policy framework that can automate provisioning and resource management.

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. 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

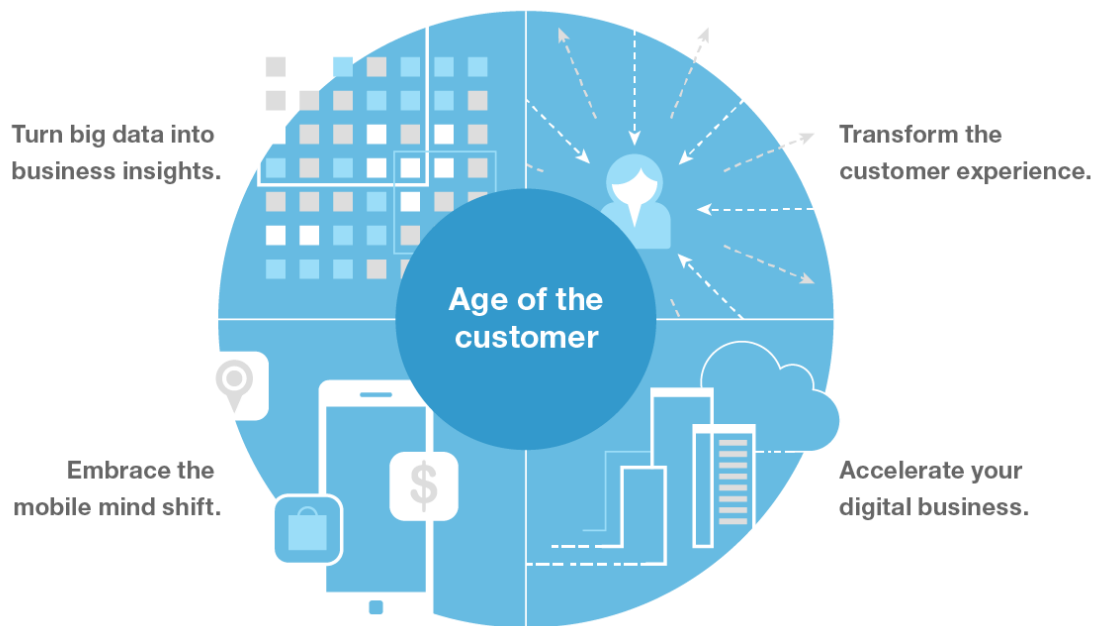
Risks measure the uncertainty of benefit and cost estimates contained within the investment. Uncertainty is measured in two ways: 1) the likelihood that the cost and benefit estimates will meet the original projections and 2) the likelihood that the estimates will be measured and tracked over time. TEI 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 B: 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 C: Glossary

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

Internal rate of return (IRR): The interest rate that will bring a series of cash flows (positive and negative) to an NPV of zero.

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 a 10% discount rate 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 D: Endnotes

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