# The Total Economic Impact™ Of Experience-Driven NetOps By Broadcom Software

Cost Savings And Business Benefits Enabled By DX NetOps And AppNeta

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*Consulting Team:  James Davis
Sean Owens*

# Executive Summary

> The cloud, software-as-a-service (SaaS) applications, and on-premises infrastructure connected by wired and wireless networks are the backbone of modern enterprises. Organizations need a deep understanding of how these systems perform to avoid the downtime that leads to revenue loss. Broadcom's DX NetOps and AppNeta give customers insights into network and application layer interactions affecting the delivery of digital services.

DX NetOps from Broadcom is a suite of tools for customers ranging from enterprises to large service provider networks. The tools integrate fault management, performance management, and flow analytics capabilities into one solution to provide operational insights across network, cloud, and SaaS applications. AppNeta, also from Broadcom, is a complementary SaaS offering that provides active and passive monitoring of networks, SaaS applications, and cloud services.

Broadcom commissioned Forrester Consulting to conduct a Total Economic Impact™ (TEI) study and examine the potential return on investment (ROI) enterprises may realize by deploying DX NetOps and AppNeta.[1] The purpose of this study is to provide readers with a framework to evaluate the potential financial impact of DX NetOps and AppNeta on their organizations.

To better understand the benefits, costs, and risks associated with this investment, Forrester interviewed five representatives with experience using Broadcom solutions. For the purposes of this study, Forrester aggregated the interviewees' experiences and combined the results into a single composite organization, a consumer products manufacturer and retailer with global operations. The organization has $5 billion in annual revenue and 25,000 employees. It maintains private wireless and wireline networks and uses a mix of SaaS applications, Amazon Web Services (AWS), Microsoft Azure public cloud services, and private servers in its data centers.

**KEY STATISTICS**

Return on investment (ROI)
**160%**

Net present value (NPV)
**$4.20M**

Prior to using Broadcom solutions, interviewees struggled to monitor their IT systems. Previous efforts to monitor networks, servers, and cloud-based services led to deployment of a patchwork of partially implemented tools. While these tools helped resolve performance issues, interviewees struggled with quickly identifying the root cause of a problem. Using multiple tools decreased the efficiency of the help desk and other technical professionals by forcing them to open various tools and correlate data across them. Without one tool to do correlation and analysis, infrastructure and operations teams additionally had to manage each tool and provide the infrastructure for each solution.

Interviewees needed to know what devices were on a network to diagnose problems but lacked comprehensive up-to-date inventory because existing processes were manual. They also needed a tool to help with alarm noise. IT equipment was being configured out of the box in a way that set off

thousands of redundant downstream alarms, resulting in extra time spent diagnosing otherwise straightforward issues.

Public internet and cloud services weren't well instrumented either. Interviewees didn't have tools to monitor the performance of VoIP or SaaS services being delivered over internet connections.

After the investment in Broadcom solutions, interviewees got a complete view of network performance over increasingly complex technology environments. Broadcom's DX NetOps machine learning algorithms and knowledge of network topology reduced alarm noise and enabled network professionals to diagnose issues more quickly. The NetOps tools also quickly discovered devices on the networks and made it easier to keep inventory up to date, saving time.

With the AppNeta solution, interviewees monitored traffic over internet connections for insights into public cloud and service providers' network performance that sometimes the vendors themselves didn't have. With AppNeta, they deployed SD-WAN and other services at a significant cost savings to MPLS circuits while maintaining performance of VoIP and other applications. Also, IT professionals proactively solved connectivity issues before complete outages occurred, saving multiple hours per incident.

**KEY FINDINGS**

**Quantified benefits.** Three-year risk-adjusted present value (PV) quantified benefits for the composite organization include:

- **Increased effectiveness of network professionals of 30%, resulting in savings of $1.5 million over three years.** The composite organization finds that Broadcom solutions enable network engineers to pinpoint issues across server, network, and application layers more quickly. The solutions' ability to discover devices and create an accurate network

topography enables the automation of previously manual database update processes. The solutions also help the composite organization reduce the mean time to resolution (MTTR) of complex issues for internet services by as much as 60% and enable the use of commodity internet services instead of more expensive MPLS services.



Reduction in network-related alarm noise **90%**

- **Increased effectiveness of IT professionals by decreasing network-related alarms by 90% and decreasing the average time per ticket by 50%, resulting in savings of $903,000 over three years.** Using machine learning and other technology, the composite organization sees alarm noise decrease by up to 90%, which results in a corresponding reduction in help desk tickets. Help desk tickets transition to lower-cost support channels. Help desk professionals also spend less time per ticket because the tools enable more precise triage capabilities.

- **Revenue from downtime avoidance, resulting in savings of $2.5 million over three years.** Network uptime increases for the composite organization with improved monitoring; it experiences less network downtime by diagnosing and correcting issues more quickly. Performance degradation can also impact revenue, and the Broadcom tools help maintain network performance before alarms go off.

- **A 50% reduction in cost for multiple point solution tools, resulting in savings of $976,000 over three years.** The composite organization monitors complex networks that connect employees to a mix of enterprise applications, public cloud, and SaaS applications. Tool sprawl costs the organization up to $2.5 million per year. After moving to Broadcom solutions, the organization retires various network, server, and application monitoring tools.

- **Cost savings on network bandwidth by enabling the use of commodity internet services, resulting in savings of $1 million over three years.** The composite organization uses the AppNeta tool to monitor broadband and SD-WAN services. With the ability to guarantee quality-of-service performance metrics, the organization forgoes the installation of new, more expensive MPLS circuits, thereby saving an estimated 70% in costs per year.

**Unquantified benefits.** Benefits that provide value for the composite organization but are not quantified in this study include:
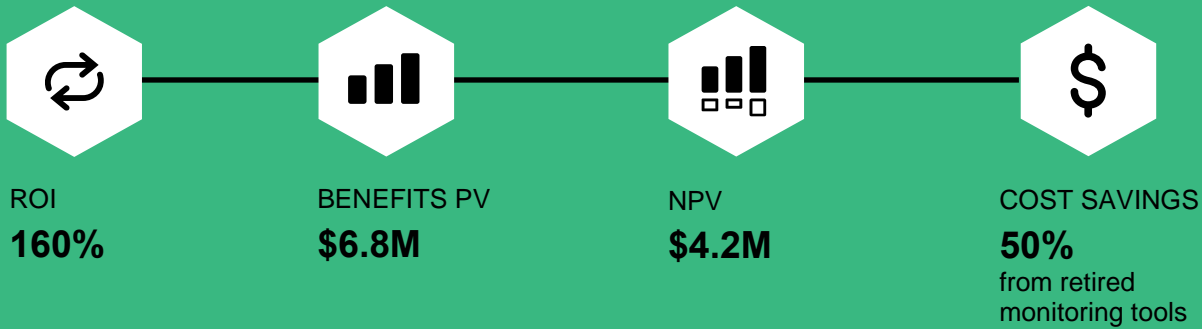
- **Prevent downtime by proactively addressing system performance.** IT professionals can diagnose more performance issues before outages occur by using Broadcom's tools.

- **Save engineers' time by giving management access to performance data.** Network professionals provide dashboards with system health metrics to line-of-business managers and executives. The organization gains more insights into the revenue impact of IT.

- **Enable fast deployment of monitoring with SaaS delivery of Broadcom tools.** Offering Broadcom tools with a SaaS delivery model enables the composite organization to quickly install and begin using the tools.

- **Save time on vendor support.** The composite organization experiences time and cost savings

on vendor support by using Broadcom's suite of tools. It no longer has to go back and forth with multiple vendors to figure out which solution is causing an issue.

**Costs.** Three-year risk-adjusted PV costs for the composite organization include:

- **Software licensing fees totaling $2.1 million over three years.** Pricing for DX NetOps enables unlimited devices and is based on a subscription model. AppNeta pricing is based on the number of network monitoring points deployed.

- **Hardware costs totaling $17,000 over three years.** The composite organization installs private servers to run the tools to comply with regional data sovereignty regulations.

- **Planning and implementation costs of $93,000 over three years.** The composite experiences a straightforward installation of the Broadcom tools and adjusts alarm thresholds before putting the tools into production.

- **Ongoing IT management costs of $469,000 over three years.** Broadcom's tools require less ongoing management, but employees of the composite organization who manage the tools invest time in learning about the capabilities of the products to enable other technical and business staff in the organization to benefit from the features and reporting capabilities.

The representative interviews and financial analysis found that the composite organization experiences benefits of $6.8 million over three years versus costs of $2.6 million, adding up to a net present value (NPV) of $4.2 million and an ROI of 160%.

ROI
**160%**

BENEFITS PV
**$6.8M**

NPV
**$4.2M**

COST SAVINGS
**50%**
from retired
monitoring tools

**Benefits (Three-Year)**

| | |
|---|---|
| Increased effectiveness of network professionals | $1.5M |
| Increased effectiveness of IT Support professionals | $903.4K |
| Revenue from downtime avoidance | $2.5M |
| Reduced cost for monitoring tools | $976.2K |
| Cost savings on internet bandwidth | $1.0M |
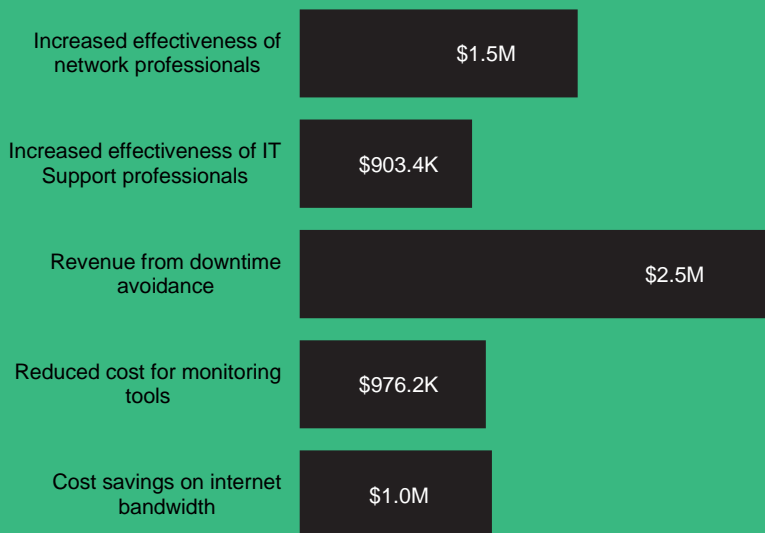
"The top benefit is a commanding understanding of the health of the network. I can tell my boss if there's a major incident occurring, how big it is, and that the rest of the system is fine."

Network reliability engineer, healthcare

## TEI FRAMEWORK AND METHODOLOGY

From the information provided in the interviews, Forrester constructed a Total Economic Impact™ framework for those organizations considering an investment in DX NetOps and AppNeta.

The objective of the framework is to identify the cost, benefit, flexibility, and risk factors that affect the investment decision. Forrester took a multistep approach to evaluate the impact that Broadcom network monitoring tools can have on an organization.

**DISCLOSURES**

Readers should be aware of the following:

This study is commissioned by Broadcom 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 study to determine the appropriateness of an investment in DX NetOps and AppNeta.

Broadcom 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.

Broadcom provided the customer names for the interviews but did not participate in the interviews.

**DUE DILIGENCE**
Interviewed Broadcom stakeholders and Forrester analysts to gather data relative to DX NetOps and AppNeta.

**INTERVIEWS**
Interviewed five representatives at organizations using DX NetOps or AppNeta to obtain data with respect to costs, benefits, and risks.

**COMPOSITE ORGANIZATION**
Designed a composite organization based on characteristics of the interviewees' organizations.

**FINANCIAL MODEL FRAMEWORK**
Constructed a financial model representative of the interviews using the TEI methodology and risk-adjusted the financial model based on issues and concerns of the interviewees.

**CASE STUDY**
Employed four fundamental elements of TEI in modeling the investment impact: benefits, costs, flexibility, and risks. Given the increasing sophistication of ROI analyses related to IT investments, Forrester's TEI methodology provides a complete picture of the total economic impact of purchase decisions. Please see Appendix A for additional information on the TEI methodology.

# The Broadcom Network Monitoring Solutions Customer Journey

Drivers leading to the DX NetOps and AppNeta investment

| Interviewees | | | | |
|---|---|---|---|---|
| **Role** | **Industry** | **Region** | **Revenue** | **Employees** |
| IT operations practice lead | Managed IT services | Europe | $1.8 billion | 8,000 |
| Enterprise management architect | Packaged goods/cosmetics | Global | $4.63 billion | 11,000 |
| Information systems team lead, enterprise monitoring engineer | Healthcare | Regional United States | $8.1 billion | 27,000 |
| Network reliability engineer | Healthcare | Western United States | $25.6 billion | 120,000 |
| Engineering manager | E-commerce | Global | $10 billion | >10,000 |

## KEY CHALLENGES

Interviewees reported using multiple tools for monitoring network, cloud, and application performance but struggled to create a definitive view of service performance to help identify the cause of technical issues such as network outages or poorly performing applications. Challenges included:

- **No single view of network performance.** With a mix of cloud providers, SaaS applications, and network providers and without a single tool to correlate network issues and other systems, finding the root cause of an issue was often difficult.

- **No comprehensive inventory of network equipment and the devices that connect to it.** Knowing the topography of a network — which devices were connected to each other and in what order — was a challenge. The process for conducting and updating inventory databases was time consuming and error prone.

- **Network equipment and servers with factory settings that sent alarms for all measurable events, resulting in information overload and little actionable insights.** Vendors often configured network switches and routers so that a simple upstream error often cascaded into a

series of thousands of alarms. These alarms did nothing to help point to the root cause of a technical issue, resulting in reduced productivity for network and help desk professionals.

- **Teams that used a variety of tools, some of which were only partially implemented.** Several interviewees reported using dozens of different tools for specific purposes that were often only partially implemented. Conversations between teams using different tools challenged problem-solving because each group had different data pointing to different issues, resulting in longer MTTR.

> **"Critical alarms often occur late at night. That means 3:00 a.m., and if you have a colleague who must wake up in the night for a false alarm, he isn't happy."**
>
> *IT ops practice lead, managed IT services*

- **Public internet and cloud services that weren't monitored properly, if at all.** Services such as VoIP that traversed public and private networks lacked tools to monitor performance. While there were many tools for monitoring private networks, network engineers had fewer tools for tracking performance of services across the public internet. To monitor networks connecting to public clouds, interviewees had to rely on analytics from their providers.

## SOLUTION REQUIREMENTS AND INVESTMENT OBJECTIVES

The interviewees' organizations searched for a solution that could:

- Provide an integrated easy-to-use suite of tools for monitoring complex enterprise environments.

- Scale to hundreds of thousands or even millions of devices and interfaces on ISP networks.

- Be highly reliable and highly available.

- Monitor resources ranging from networks to applications (from layer 2 to 7 of the OSI stack) in a heterogeneous environment.

- Provide a single place to view the health of networks, services, and distributed endpoints.

- Provide operational insights about user experience to save time and costs by enabling faster problem resolution.

- Offer the functionality equivalent of a best-of-breed approach, saving time and costs versus integrating disparate tools.

## COMPOSITE ORGANIZATION

Based on the interviews, Forrester constructed a TEI framework, a composite company, and an ROI analysis that illustrates the areas financially affected. The composite organization is representative of the five interviewees, and it is used to present the aggregate financial analysis in the next section. The

composite organization has the following characteristics:

**Description of composite.** The global multibillion-dollar B2C organization manufactures and sells consumer packaged goods (CPG) in retail locations, which the company sometimes owns and operates. The composite organization is based in the US and has operations in Europe and parts of Asia.

**Deployment characteristics.** IT teams support 25,000 employees and monitor 40,000 devices (including multiple ports within switches and routers) across a mix of public internet and private wired and wireless networks. They monitor multiple SaaS applications, VoIP services for outsourced customer service, cloud platform services, and private servers in the company's data centers.

**Key Assumptions**
- **$5B revenue**
- **US headquarters and global operations**
- **25,000 employees**

# Analysis Of Benefits

Quantified benefit data as applied to the composite

### Total Benefits

| Ref. | Benefit | Year 1 | Year 2 | Year 3 | Total | Present Value |
|------|---------|--------|--------|--------|-------|---------------|
| Atr | Increased effectiveness of network professionals | $585,900 | $585,900 | $585,900 | $1,757,700 | $1,457,047 |
| Btr | Increased effectiveness of IT Support professionals | $363,285 | $363,285 | $363,285 | $1,089,855 | $903,436 |
| Ctr | Revenue from downtime avoidance | $1,000,000 | $1,000,000 | $1,000,000 | $3,000,000 | $2,486,852 |
| Dtr | Reduced cost for monitoring tools | $562,500 | $562,500 | $0 | $1,125,000 | $976,240 |
| Etr | Cost savings on internet bandwidth | $405,000 | $405,000 | $405,000 | $1,215,000 | $1,007,175 |
|  | Total benefits (risk-adjusted) | $2,916,685 | $2,916,685 | $2,354,185 | $8,187,555 | $6,830,750 |

## INCREASED EFFECTIVENESS OF NETWORK PROFESSIONALS

**Evidence and data.** After implementing Broadcom's solutions, interviewees found that they were able to monitor everything network related, including firewalls, telephony services, and load balancers, up to the application layer.

- The automation of device database inventory helped create a view of network topography, saving 40 hours per month for one organization's enterprise monitoring engineer.

- With better information for root cause analysis, a network reliability engineer at a healthcare provider cut MTTR by 60% — and to 30 minutes for most events.

- Organizations were able to triage alarms more effectively, enabling a greater percentage of service tickets to go to lower-cost IT personnel.

- A network reliability engineer at a healthcare provider saved hours on incidents by identifying service outages and device misconfigurations of which network and cloud providers weren't always aware.

- The Broadcom tools enabled an engineering manager at an e-commerce company to monitor network connections to multiple outsourcing partners with a team of eight people instead of the estimated 20 people needed without the tool.

**Modeling and assumptions.** Based on the customer interviews, Forrester assumes:

> **"I am responsible for all enterprise management, [including] network, systems, and applications [using] the Broadcom tools. You couldn't do that with other tools. You would need a team."**
>
> *Enterprise management architect, packaged goods/cosmetics*

- The composite has 20 network administrators on staff, who spend 70% of their time on network-related monitoring and management.

- The employees spend 30% less time on typical tasks due to the use of Broadcom solutions.

- The fully burdened annual salary for a network administrator is $155,000.

**Risks.** The risks to realizing this benefit relate to IT and management processes, including:

- Retiring older monitoring tools, including tools that groups such as server administrators used.

- Leveraging automation to direct tasks to lower-cost resources.

- Using reporting capabilities to give other business units an understanding of network performance.

**Results.** To account for these risks, Forrester adjusted this benefit downward by 10%, yielding a three-year risk-adjusted total PV (discounted at 10%) of $1.5 million.

| Increased Effectiveness Of Network Professionals | | | | | |
|------|------|------|------|------|------|
| Ref. | Metric | Source | Year 1 | Year 2 | Year 3 |
| A1 | Number of network admins | Composite | 20 | 20 | 20 |
| A2 | Annually fully burdened salary for network admin | TEI standard | $155,000 | $155,000 | $155,000 |
| A3 | Percentage of time spent on network-related monitoring and management | TEI standard | 70% | 70% | 70% |
| A4 | Percentage of time saved | Interviews | 30% | 30% | 30% |
| At | Increased effectiveness of network professionals | A1*A2*A3*A4 | $651,000 | $651,000 | $651,000 |
| | Risk adjustment | ↓10% | | | |
| Atr | Increased effectiveness of network professionals (risk-adjusted) | | $585,900 | $585,900 | $585,900 |
| | Three-year total: $1,757,700 | | Three-year present value: $1,457,047 | | |

## INCREASED EFFECTIVENESS OF IT SUPPORT PROFESSIONALS

**Evidence and data.** Interviewees said that the Broadcom tools enabled IT operations teams and help desk personnel to resolve many issues on behalf of the network team.

- The use of DX NetOps helped reduce alarm noise by 90%, according to interviewees at a managed IT services provider and a packaged goods/cosmetics company.

- Interviewees said that help desk professionals could handle more service tickets because the Broadcom tools did a better job of pinpointing where an issue occurred. "The IT operations center is now on a lot of the calls instead of the network team. They can get on the phone and say, 'No, there is no network [issue] going on,'" an enterprise monitoring engineer at a healthcare provider said.

- The use of machine learning algorithms applied to asset databases and network topology allowed

help desks to diagnose issues more quickly, cutting the time spent on normal incident tickets by 50%, according to an enterprise management architect at a packaged goods/cosmetics firm.

- Broadcom solutions enabled help desk and IT operations personnel to do server update maintenance instead of engineers during overnight watches when the impact on network traffic was minimal, according to the network reliability engineer at a healthcare provider. The company maintained 99% or better uptime in part by minimizing network interruptions from maintenance and other activities.

- Reporting capabilities enabled the help desk and business unit managers to view dashboards that gave updates on the performance of all IT systems without queries to engineers.

**Modeling and assumptions.** Based on the customer interviews, Forrester assumes:

- The composite organization has 3,500 alarms per month before implementation.

- It estimates 2,000 alarms per month turn into help desk tickets.

- After implementing Broadcom solutions, the composite organization experiences a 90% reduction in network-related alerts, resulting in a total of 350 network-related alarms per month.

- It experiences a 90% reduction in network-related alerts that become help desk tickets and a 50% reduction in time spent on these tickets by personnel.

- The composite organization has eight major network-related issues per month and spends 8 hours per incident on remediation.

- After implementing Broadcom solutions, the number of major network-related issues that escalate to subject matter experts drops by 50%.

- The composite organization's support personnel spend 30 minutes on major network incident remediation, on average, after implementing Broadcom solutions.

**Risks.** The potential risks to realizing this benefit include:

- The level of use of DX NetOps and AppNeta tools for monitoring internal and public networks.

- The size and complexity of the enterprise network and the number of remote users.

**Results.** To account for these risks, Forrester adjusted this benefit downward by 10%, yielding a three-year risk-adjusted total PV of $903,000.

> **"[The tool] is really our eyes and ears out in the world. We're completely blind without it. It has given us valuable insights and is used very regularly."**
>
> *Engineering manager, e-commerce*

## Increased Effectiveness Of IT Support Professionals

| Ref. | Metric | Source | Year 1 | Year 2 | Year 3 |
|---|---|---|---|---|---|
| B1 | Network-related alarms per month | Composite | 3,500 | 3,500 | 3,500 |
| B2 | Network-related alarms that turn into help desk tickets | Composite | 2,000 | 2,000 | 2,000 |
| B3 | Reduction in network-related alarms with Broadcom | Interviews | 90% | 90% | 90% |
| B4 | Network-related alarms per month with Broadcom | B1*(1-B3) | 350 | 350 | 350 |
| B5 | Reduction in network-related help desk tickets with Broadcom | Interviews | 90% | 90% | 90% |
| B6 | Network-related alarms that result in help desk tickets with Broadcom per month | B4*(1-B5) | 35 | 35 | 35 |
| B7 | Time per ticket (minutes) | Interviews | 20 | 20 | 20 |
| B8 | Time per ticket with Broadcom (minutes) | Interviews | 10 | 10 | 10 |
| B9 | Average hourly fully burdened rate for support professionals | TEI standard | $45 | $45 | $45 |
| B10 | Subtotal: cost savings from reduced help desk calls | (B2*B7-B6*B8)*B9/60*12 | $356,850 | $356,850 | $356,850 |
| B11 | Major network-related issues per month | Composite | 8 | 8 | 8 |
| B12 | Major network-related issues with Broadcom per month | Composite | 4 | 4 | 4 |
| B13 | Time per issue (hours) | Composite | 8 | 8 | 8 |
| B14 | Time per issue with Broadcom (hours) | Composite | 1 | 1 | 1 |
| B15 | Average hourly fully burdened rate for support professionals | TEI standard | $65 | $65 | $65 |
| B16 | Subtotal: cost savings from reduced major network issues | (B11*B13-B12*B14)*B15*12 | $46,800 | $46,800 | $46,800 |
| Bt | Increased effectiveness of IT support professionals | B10+B16 | $403,650 | $403,650 | $403,650 |
| | Risk adjustment | ↓10% | | | |
| Btr | Increased effectiveness of IT support professionals (risk-adjusted) | | $363,285 | $363,285 | $363,285 |
| | **Three-year total: $1,089,855** | | **Three-year present value: $903,436** | | |

### REVENUE FROM DOWNTIME AVOIDANCE

**Evidence and data.** Hardware and software technology failures are still the most frequent cause of business interruption. Interviewees found that the use of DX NetOps and AppNeta helped avoid downtime that could lead to lost revenue. Even when downtime occurred, the tools enabled employees to diagnose and correct problems more quickly, saving hours of time.

Interviewees used the AppNeta tool, for example, to diagnose issues that their cloud and network service providers sometimes failed to spot.

- "We can see impairments that happened inside the cloud providers' networks," a network reliability engineer at a large healthcare provider said. "When we call them and say, 'Did you guys have a problem between location X and Y at this time of day?' they say, 'Oh, yeah. We did.'" The

ability to be proactive prevented downtime that would have impacted physicians' ability to access patient information and ultimately reduced patient billing hours. The network reliability engineer also cited an incident with a network service provider exhibiting a problem four times in one year, which Broadcom's tools helped identify as a router in the vendor's network with a software bug. The network engineer estimated that it would have taken three full-time employees a work week to solve that problem without the AppNeta tool and said, "Troubleshooting that would take months without the tool can get reduced down to 2 minutes."

- A large e-commerce company used customer support centers around the globe, and VoIP provided voice calls over regular internet connections. When a contact center had issues connecting calls, using Broadcom tools, the partner diagnosed the issue with an ISP within minutes and rerouted call traffic over another connection. The flagged call rate dropped by 45%, and call connectivity rates jumped 80%. When dealing with an estimated 38,000 calls per site per day, the immediate business impact was significant. The long-term impact on customer loyalty, although hard to directly attribute to Broadcom tool use, was also significant.

- A managed IT services provider using DX NetOps monitored data points of equipment for a major automaker, including the temperature of networking gear. "If you don't monitor one value, 50 cars are falling to ground off the production line; that's $2 million to $5 million you lose in 5

minutes," noted the company's IT operations practice lead. The managed services provider increased customers' network availability from 95% uptime to 99.99% in many cases, resulting in increased output of production lines.

**Modeling and assumptions.** Based on interviews, the composite organization:

- Earns $5 billion a year in revenue.

- The revenue that is impacted using Broadcom tools is 1%.

- The amount of revenue loss per year due to network and/or IT downtime is 10%.

- The percentage of loss avoided by using Broadcom tools is 25%.

**Risks.** The potential risks to realizing this benefit include:

- Organizations have a hard time accurately measuring and correlating IT downtime to revenue loss; in some cases, a poorly performing website can result in lower sales, even though the system is running, for example.

- Finding the root cause of an IT outage is difficult because many systems are interdependent. Visibility into the cause of vendor outages for cloud services, for example, can also make it hard to attribute outages purely to the network or a particular server.

**Results.** To account for these risks, Forrester adjusted this benefit downward by 20%, yielding a three-year risk-adjusted total PV of $2.5 million.

## Revenue From Downtime Avoidance

| Ref. | Metric | Source | Year 1 | Year 2 | Year 3 |
|------|--------|--------|--------|--------|--------|
| C1 | Annual revenue | Composite | $5,000,000,000 | $5,000,000,000 | $5,000,000,000 |
| C2 | Percentage of revenue impacted by NetOps/AppNeta | Composite | 1% | 1% | 1% |
| C3 | Percentage of revenue loss due to network/IT downtime or brownout | Composite | 10% | 10% | 10% |
| C4 | Percentage of loss avoided with NetOps/AppNeta | Composite | 25% | 25% | 25% |
| Ct | Revenue from downtime avoidance | C1*C2*C3*C4 | $1,250,000 | $1,250,000 | $1,250,000 |
| | Risk adjustment | ↓20% | | | |
| Ctr | Revenue from downtime avoidance (risk-adjusted) | | $1,000,000 | $1,000,000 | $1,000,000 |
| | **Three-year total: $3,000,000** | | **Three-year present value: $2,486,852** | | |

**REDUCED COST FOR MONITORING TOOLS**

**Evidence and data.** Interviewees cited the cost and ineffective use of existing tools as a motivation for the adoption of Broadcom solutions. All organizations interviewed used a mix of tools for monitoring private networks. Ironically, some had no tools in place for monitoring public cloud and internet services because they said they simply could not find a tool that provided data they needed.

- One healthcare provider had 67 different tools for subject matter experts for everything from networks to applications and servers, according to an enterprise monitoring engineer. Typically, if area experts needed to monitor a specific data point, they acquired a tool for the job. While the IT team was able to fix outages, there was no view into the root cause. To combat the sprawling inventory (and cost) of all these tools, the healthcare organization decided to go with the DX NetOps suite of tools and saved $2 million per year by retiring 37 different products.

- Another interviewee considered tools from competing vendors to monitor a mix of 2,500 network devices, more than 4,000 servers, 500 databases, and a mix of private cloud

environments. The enterprise management architect at a packaged goods/cosmetics company said, "Both solutions would have been multiple millions per year in costs." The company also retired a service discovery tool that required 40 servers. Broadcom's solution required only one server, saving on both hardware and ongoing management costs.

> **"We saw tremendous value in going with a suite of tools where basically it was one [call to make]. If we had a problem, we just opened a ticket with one vendor."**
>
> *Information systems team lead, enterprise monitoring engineer, healthcare provider*

**Modeling and assumptions.** To calculate the cost savings for monitoring tools, the composite:

- Spends $2.5 million per year on tools to monitor networks, servers, and cloud services.

- Phases out use of 25% of the tools in Year 1 and another 25% of the tools in Year 2 with the Broadcom solutions.

**Risks.** Factors that can impact the amount of cost savings include:

- The geographic reach (e.g., in distance or number of continents) and complexity of the wireless and wired networks.

- The number of associated servers and other devices that connect to those networks.

- The number of SaaS and cloud services in use.

- The number of employees and associated PCs and laptops in use.

**Results.** To account for these risks, Forrester adjusted this benefit downward by 10%, yielding a three-year risk-adjusted total PV of $976,000.

| Reduced Cost For Monitoring Tools | | | | | |
|---|---|---|---|---|---|
| **Ref.** | **Metric** | **Source** | **Year 1** | **Year 2** | **Year 3** |
| D1 | Cost of previous tools | Interview | $2,500,000 | $2,500,000 | $0 |
| D2 | Percentage of monitoring tools retired annually with Broadcom | Interview | 25% | 25% | 25% |
| Dt | Reduced cost for monitoring tools | D1*D2 | $625,000 | $625,000 | $0 |
| | Risk adjustment | ↓10% | | | |
| Dtr | Reduced cost for monitoring tools (risk-adjusted) | | $562,500 | $562,500 | $0 |
| | **Three-year total: $1,125,000** | | **Three-year present value: $976,240** | | |

### COST SAVINGS ON INTERNET BANDWIDTH

**Evidence and data.** The implementation of AppNeta enabled the monitoring of user experience outside of the corporate network and the diagnosis of technical issues inside service and cloud provider networks — something impossible with any other tool.

- An e-commerce company wanted to reduce costs by phasing out voice services over MPLS circuits and using VoIP services instead. With the AppNeta tool, the company ensured that network performance met the latency and jitter requirements for VoIP services. The engineering manager for the e-commerce firm said, "Steady state, we would be spending $7 million to

$8 million per year on MPLS; we are spending $1.2 million on direct internet access instead."

- A healthcare provider operating across multiple states had networks from multiple service providers connected to more than 900 doctors' offices and hospitals that it needed to monitor. The network reliability engineer for the healthcare provider said, "When you are in the healthcare system and you know that what you do affects how fast someone gets an X-ray or the quality of their scanned image, it really affects people's lives." The AppNeta tool enabled the provider to ensure that internet access to billing and other medical systems performed properly. The company also used SD-WAN services to network

hundreds of remote locations instead of MPLS circuits, while managing to a standard of no more than 5% packet loss.

**Modeling and assumptions.** To calculate the cost savings on internet bandwidth, the composite:

- Has 100 offices that are being monitored, and each location has a single wireline link for internet service.

- Spends $6,000 per year on an MPLS link.

- Recovers 75% of the cost of an MPLS link for the same amount of bandwidth based on typical broadband service costs.

**Risks.** Organizations may experience a different level of cost savings on bandwidth based on factors including:

- The number of locations that are connected.

- Different levels of redundancy for internet services, including multiple links from different service providers and the implementation of mesh service architectures (e.g., interconnecting sites directly).

- The average and peak amount of bandwidth used monthly by an organization.

- The availability of competing internet providers and/or SD-WAN services.

> **"The business unit doesn't have to call the IT application group. They can actually check into it themselves and look at the metrics."**
>
> *Network reliability engineer, healthcare*

**Results.** To account for these risks, Forrester adjusted this benefit downward by 10%, yielding a three-year risk-adjusted total PV of $1 million.

## Cost Savings On Internet Bandwidth

| Ref. | Metric | Source | Year 1 | Year 2 | Year 3 |
|------|--------|--------|--------|--------|--------|
| E1 | Number of locations | Composite | 100 | 100 | 100 |
| E2 | Cost per MPLS link per year | Composite | $6,000 | $6,000 | $6,000 |
| E3 | Percentage captured | | 75% | 75% | 75% |
| Et | Cost savings on internet bandwidth | E1*E2*E3 | $450,000 | $450,000 | $450,000 |
| | Risk adjustment | ↓10% | | | |
| Etr | Cost savings on internet bandwidth (risk-adjusted) | | $405,000 | $405,000 | $405,000 |
| | Three-year total: $1,215,000 | | Three-year present value: $1,007,175 | | |

**UNQUANTIFIED BENEFITS**

Interviewees mentioned the following additional benefits that their organizations experienced but were not able to quantify:

- **Prevent downtime by proactively addressing system performance.** A holistic view of network, server, application, and cloud performance enables fixes of performance issues before they turn into outages or downtime.

- **Save engineers' time by giving management access to performance data.** The tools provide reports that business managers can use to view system performance, freeing up engineers for other tasks. Broadcom's licensing allows business unit managers to view performance reports without adding to the overall cost.

- **Easily install Broadcom tools and quickly deploy monitoring.** Interviewees said the Broadcom products were easy to install. The engineering manager for an e-commerce company also noted that the SaaS delivery model of the AppNeta solution became more important because of the pandemic: "The longest lead time we have is just getting a device in the country through customs and getting it installed and ready to provision." The manager also noted that the short time to install the tools saved on expenses and labor.

- **Save time on vendor support.** Interviewees that retired multiple monitoring tools also saved time on support calls. Using Broadcom as the primary vendor meant a single support call for a technical issue instead of chasing down issues with multiple vendors at a time.

- **Allow business partners to monitor critical network and application services.** One interviewee let business partners monitor networks with AppNeta to discover issues and work with their service providers for technical support rather than relying on the interviewee.

The time savings resulted in the interviewee's organization being able to shift resources to building a new web site.

**FLEXIBILITY**

The value of flexibility is unique to each customer. There are multiple scenarios in which a customer might implement Broadcom's solutions and later realize additional uses and business opportunities, including:

- **Allow management teams to allocate capital to IT projects that make the most impact on uptime and performance.** The network reliability engineer at a healthcare provider said: "We have executives that can now make decisions with data. We can make important decisions about where to spend our capital, like if we should be increasing the bandwidth from one location to another or if we should be looking at outsourcing. It sets the stage for changing to a proactive mindset and saying, 'We will fix problems before they impact the caregiver.'"

- **Reduce development time and costs by testing performance in pre-production environments.** As interviewees move to more cloud-based applications, they can test system performance before moving new applications into production and have confidence that applications will perform as expected.

- **Monitor new services such as SD-WAN as they are added.** Interviewees are planning to use Broadcom tools, including AppNeta, to monitor SD-WAN services from third parties rather than relying solely on vendors' tools to see if they meet service-level agreements.

# Analysis Of Costs

Quantified cost data as applied to the composite

## Total Costs

| Ref. | Cost | Initial | Year 1 | Year 2 | Year 3 | Total | Present Value |
|------|------|--------:|-------:|-------:|-------:|------:|--------------:|
| Ftr | Software licensing fees | $0 | $825,000 | $825,000 | $825,000 | $2,475,000 | $2,051,653 |
| Gtr | Hardware costs | $16,800 | $0 | $0 | $0 | $16,800 | $16,800 |
| Htr | Planning and implementation costs | $92,950 | $0 | $0 | $0 | $92,950 | $92,950 |
| Itr | Ongoing IT management | $0 | $163,800 | $163,800 | $245,700 | $573,300 | $468,879 |
| | Total costs (risk-adjusted) | $109,750 | $988,800 | $988,800 | $1,070,700 | $3,158,050 | $2,630,282 |

### SOFTWARE LICENSING FEES

**Evidence and data.** Interviewees said they evaluated solutions from competitors but found costs to be at least double that of the Broadcom solutions in some cases.

**Modeling and assumptions.** For the composite organization, Forrester assumes:

- The composite organization deploys 40,000 devices. Device count includes all the ports on a wired or wireless switch or router as well as servers, applications, employee devices, and cloud applications.

- The composite organization has applications running on a mix of AWS and Azure cloud along with private servers.

- The composite organization uses DX NetOps to monitor private wireless and wired networks and the devices and applications running on those networks.

- The composite organization uses AppNeta to monitor public internet networks, SaaS applications, and public cloud services from 100 different monitoring points.

**Risks.** Risks that could impact these costs include:

- The size and geographic diversity of an organization.

- The number of network service providers, cloud providers, and SaaS applications in use.

- The implementation of more complicated mesh network architectures.

- Regulatory requirements for data privacy, which could necessitate installing Broadcom software on private servers or on private cloud services.

**Results.** To account for these risks, Forrester adjusted this cost upward by 10%, yielding a three-year risk-adjusted total PV (discounted at 10%) of $2.1 million.

## Software Licensing Fees

| Ref. | Metric | Source | Initial | Year 1 | Year 2 | Year 3 |
|------|--------|--------|---------|--------|--------|--------|
| F1 | License fees | Composite | $0 | $750,000 | $750,000 | $750,000 |
| Ft | Software licensing fees | F1 | $0 | $750,000 | $750,000 | $750,000 |
| | Risk adjustment | ↑10% | | | | |
| Ftr | Software licensing fees (risk-adjusted) | | $0 | $825,000 | $825,000 | $825,000 |
| | Three-year total: $2,475,000 | | | Three-year present value: $2,051,653 | | | |

### HARDWARE COSTS

**Evidence and data.** The Broadcom DX NetOps solution is sold and installed as a software product. Some interviewees in industries such as healthcare have regulatory requirements for some data types that necessitate the use of on-premises hardware for installation.

**Modeling and assumptions.** For the composite organization, Forrester assumes that:

- The composite organization deploys four enterprise-grade servers to run the DX NetOps software.

- The servers deploy in the initial phase of the rollout and cost $4,000 each.

**Risks.** Risks that could impact these costs include:

- The size and complexity of an organization's network.

- The cost of commodity hardware.

**Results.** To account for these risks, Forrester adjusted this cost upward by 5%, yielding a three-year risk-adjusted total PV of $16,800.

## Hardware Costs

| Ref. | Metric | Source | Initial | Year 1 | Year 2 | Year 3 |
|------|--------|--------|---------|--------|--------|--------|
| G1 | Hardware costs per year | Composite | $4,000 | | | |
| G2 | Number of units | Composite | 4 | | | |
| Gt | Hardware costs | G1*G2 | $16,000 | $0 | $0 | $0 |
| | Risk adjustment | ↑5% | | | | |
| Gtr | Hardware costs (risk-adjusted) | | $16,800 | $0 | $0 | $0 |
| | Three-year total: $16,800 | | | Three-year present value: $16,800 | | | |

## PLANNING AND IMPLEMENTATION COSTS

**Evidence and data**. Interviewees said that the implementation of the Broadcom tools was straightforward.

- The enterprise management architect at a packaged goods/cosmetics company said: "Installation was easy. We didn't need a team to install; we just stood up the SaaS console." Planning to live production took two to three months' time for the complete suite of DX NetOps tools.

- The network reliability engineer at a healthcare company said that it took one employee an estimated 40 hours of planning for the initial implementation of AppNeta for monitoring three data centers, seven cloud services, and 900 clinics. The AppNeta monitoring tool took one employee less than 1 hour to install, according to the engineering manager at the e-commerce company.

- Four of the five interviewees did not use any third-party consulting or systems integration vendors for implementation. A healthcare provider spent an unspecified amount of money on consulting mainly to help migrate other

custom reports and functions from other tools into the Broadcom environment, according to the enterprise monitoring engineer at a healthcare provider.

**Modeling and assumptions.** For the composite organization, Forrester assumes:

- The composite organization uses a team of 10 employees for the planning and implementation of Broadcom tools.

- The composite organization takes a total of 130 hours to plan and implement the tools.

- The hourly salary of the employees is $65 fully burdened.

**Risks.** Risks that could impact these costs include:

- The size and geographic diversity of an organization.

- The number of network service providers, cloud providers, and SaaS applications in use.

- Average salaries for deployed team members.

**Results.** To account for these risks, Forrester adjusted this cost upward by 10%, yielding a three-year risk-adjusted total PV of $93,000.

## Planning And Implementation Costs

| Ref. | Metric | Source | Initial | Year 1 | Year 2 | Year 3 |
|------|--------|--------|---------|--------|--------|--------|
| H1 | Number of people | Composite | 10 | | | |
| H2 | Hourly rate per person | TEI standard | $65 | | | |
| H3 | Hours | Interviews | 130 | | | |
| Ht | Planning and Implementation costs | H1*H2*H3 | $84,500 | $0 | $0 | $0 |
| | Risk adjustment | ↑10% | | | | |
| Htr | Planning and Implementation costs (risk-adjusted) | | $92,950 | $0 | $0 | $0 |
| | **Three-year total: $92,950** | | | **Three-year present value: $92,950** | | |

## ONGOING IT MANAGEMENT

**Evidence and data**. Interviewees said that both Broadcom solutions required less ongoing management effort than other solutions. Employees who manage the tools need to invest some time in learning about the capabilities of the products to enable other technical and business staff in the organization to benefit from the features and reporting capabilities. The information systems team lead for a healthcare provider reported four employees using the DX NetOps tools to monitor 15,000 devices, with two of them also managing other systems monitoring products.

The IT operations practice lead for management and data center infrastructure monitoring for a managed IT services provider reported one employee for each of its 15 customers of network, systems, and application management. The tools monitored 140 to 200 networks.

**Modeling and assumptions.** For the composite organization, Forrester assumes:

- The composite organization has one employee dedicated to managing the Broadcom tools.

- The composite organization adds another employee to manage the Broadcom tools in Year 3. The employee spends 50% of working time on tools management.

- The hourly salary of a network engineering professional is $75 fully burdened.

**Risks.** Risks that can impact the cost include:

- The size and complexity of the organization's network.

- Average salaries for deployed team members.

- The deployment of software on-premises instead of the standard SaaS implementation.

**Results.** To account for these risks, Forrester adjusted this cost upward by 5%, yielding a three-year risk-adjusted total PV of $469,000.

| Ongoing IT Management | | | | | | |
|---|---|---|---|---|---|---|
| Ref. | Metric | Source | Initial | Year 1 | Year 2 | Year 3 |
| I1 | Number of FTEs | Composite | 1 | 1 | 1 | 1.5 |
| I2 | Hourly rate per network engineer | TEI standard | $75 | $75 | $75 | $75 |
| It | Ongoing IT management | I1*I2*2,080 | $0 | $156,000 | $156,000 | $234,000 |
| | Risk adjustment | ↑5% | | | | |
| Itr | Ongoing IT management (risk-adjusted) | | $0 | $163,800 | $163,800 | $245,700 |
| | **Three-year total: $573,300** | | | **Three-year present value: $468,879** | | |

# Financial Summary

**CONSOLIDATED THREE-YEAR RISK-ADJUSTED METRICS**

### Cash Flow Chart (Risk-Adjusted)
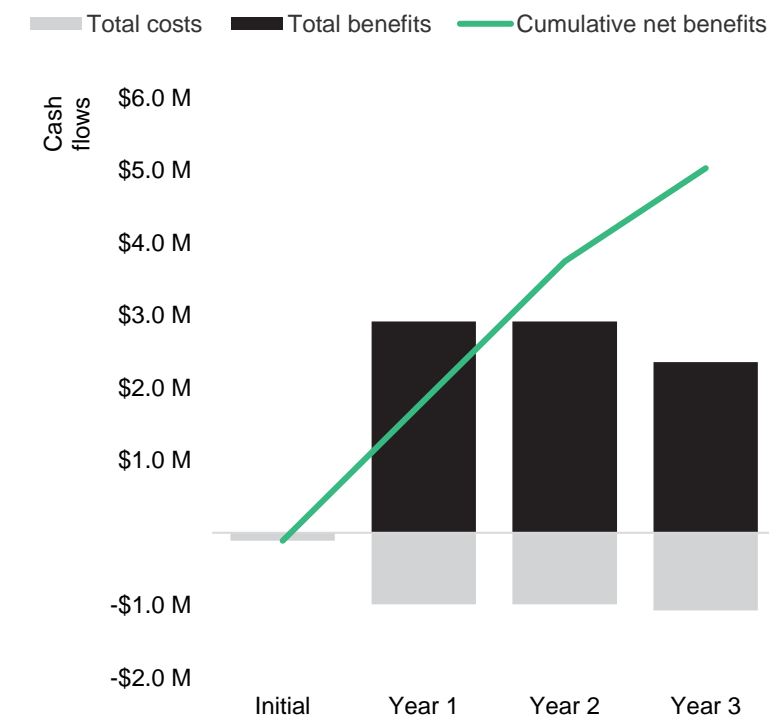


The financial results calculated in the Benefits and Costs sections can be used to determine the ROI and NPV for the composite organization's investment. Forrester assumes a yearly discount rate of 10% for this analysis.

**These risk-adjusted ROI and NPV values are determined by applying risk-adjustment factors to the unadjusted results in each Benefit and Cost section.**

## Cash Flow Analysis (Risk-Adjusted Estimates)

|  | Initial | Year 1 | Year 2 | Year 3 | Total | Present Value |
|---|---|---|---|---|---|---|
| Total costs | ($109,750) | ($988,800) | ($988,800) | ($1,070,700) | ($3,158,050) | ($2,630,282) |
| Total benefits | $0 | $2,916,685 | $2,916,685 | $2,354,185 | $8,187,555 | $6,830,750 |
| Net benefits | ($109,750) | $1,927,885 | $1,927,885 | $1,283,485 | $5,029,505 | $4,200,468 |
| ROI |  |  |  |  |  | 160% |
| Payback period |  |  |  |  |  | <6 months |

# Appendix A: Total Economic Impact

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

## TOTAL ECONOMIC IMPACT APPROACH

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

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

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

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

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

## PRESENT VALUE (PV)

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

## NET PRESENT VALUE (NPV)

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

## RETURN ON INVESTMENT (ROI)

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

## DISCOUNT RATE

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

## PAYBACK PERIOD

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

# Appendix B: Endnotes

[1] 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.

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