Should I Outsource Infrastructure?

AN INSIGHTFUL TCO ANALYSIS OF ON-PREMISE VS. OUTSOURCED WORKLOADS

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INTRODUCTION

The question, "Should I outsource?" is probably one of the oldest inquiries ever made in the history of the IT profession. Today, though, the question of outsourcing has evolved dramatically, especially for infrastructure. In addition to basic colo, there are hosted private clouds, public clouds, and hybrids. Plus, there are even new ways for IT to function as an organization. IT can be a service broker for business units, a clearinghouse for information, and so forth.

The fundamental questions about outsourcing, however, have never changed: Will this make business sense? What are the investments, expenses, and payoffs? This paper addresses these most important and basic issues. Based on a Total Cost of Ownership (TCO) modeling methodology built from our extensive experience working with IT organizations of all sizes, the paper shows how you can make a detailed, informed assessment of the financial side of the outsourcing decision.

OVERVIEW OF INFRASTRUCTURE ECONOMICS

Not all dollars are equal. When calculating the costs of building and maintaining IT infrastructure, a business will view a dollar spent on a capital expenditure (CapEx) quite differently from a dollar spent on operating the infrastructure (OpEx). CapEx and OpEx are subject to different accounting rules and they reflect different values to the business. CapEx spent on equipment and software is an asset, carried on a company's balance sheet. OpEx hits the income statement and affects earnings.

What does this have to do with managing IT infrastructure? A lot, actually. Both CapEx and OpEx figures, which play prominently in any IT manager's efforts to budget for infrastructure, serve to answer the most basic question that is on the lips of every shareholder: "What is the company doing with my money?"

The CEO is responsible for answering that essential shareholder question. His or her perspective on IT infrastructure expense should also inform the IT manager's thinking about the issue. The IT manager is entrusted with the IT department's portion of the shareholder's money. Regarding CapEx, the CEO wants to know, "Is this infrastructure asset the best possible use of the shareholder's money?" Could it be better invested in some sort of strategic asset, such as a research laboratory or a cutting edge manufacturing plant? The CEO also regards OpEx with suspicion because a dollar saved in OpEx is worth many times that amount in entity valuation. If a stock is trading at 10 times earnings, for instance, a dollar saved on OpEx is actually worth $10 to the shareholders, a group that invariably includes the CEO. This formula applies for both public and private companies.

TOTAL COST OF OWNERSHIP

Outsourcing infrastructure can be, in many cases, a preferable alternative to building and running IT infrastructure in-house. It is not always the best alternative, for many reasons, but on a purely financial basis, it typically compares favorably. To understand the financial impact of outsourcing, it is first necessary to understand what one's infrastructure truly costs to build and run. There may be hidden or indirect costs to consider in addition to expenses that are well understood. You need to know the Total Cost of Ownership (TCO) for your IT assets.

TCO is a critical, but somewhat subjective number. To make an informed decision about outsourcing infrastructure, it's absolutely essential to understand the complete costs of maintaining infrastructure in-house. However, approaches to estimating TCO vary from one organization to another. In general, though, the more thorough the analysis and comprehensive the estimate, the more valuable the TCO figure will be for making the right business decision. Rackspace® has adopted the Alinean® TCO methodology. The Alinean methodology, and ones like it, are effective because they take into account the broadest range of potential costs and model them based on realistic assumptions. Alinean separates TCO into three basic cost categories:

- **Capital Costs (CapEx)** – defined as new purchases of hardware and software
- **Operating Expenses (OpEx)** – including hardware and software support costs, personnel, and related services
- **Indirect Business Costs** – including the impact of downtime on productivity, the increase of business agility, and so forth

MODELING ABC COMPANY'S INFRASTRUCTURE TCO

To make the TCO analysis useful and easy to understand, we will apply the Alinean methodology to ABC Company, a hypothetical infrastructure. ABC Company should look familiar to you if you are involved in managing infrastructure at a mid-to-large sized enterprise. ABC is a financial services company that runs a critical, web-based business application on the Microsoft® Windows Server® platform. The application uses Microsoft SQL Server® for its database component. ABC Company uses VMware vSphere® software to virtualize the dedicated servers. The application requires the following infrastructure elements:

Servers

- 10 servers with 2 x hex-core processors and 256GB of RAM – running Windows Server using SQL Server Enterprise database (not virtualized by VMware vSphere)

- 25 servers with 4 x octa-core processors and 256GB of RAM – virtualized by VMware vSphere and running Windows as the guest operating system
- 3 servers with 1 x hex-core processor and 32GB of RAM – virtualized by VMware and running Windows with database to support multiple VMs for Microsoft Exchange

Network Equipment

- 2 Cisco® ASA 5555-X Series Next-Generation Firewalls
- 1 Imperva® SecureSphere® Web Application Firewall (WAF)
- 2 F5® BIG-IP® 3600 Load Balancer
- 1 Intrusion Detection (IDS)

Storage

- 100TB of EMC® VNX5700 storage
- 250TB of EMC Isilon® NL400 storage

TCO SUMMARY

The table below shows the final output of the Alinean TCO analysis on ABC Company's infrastructure. In this three-year view, the TCO will be $11,627,439 to host the infrastructure in-house. Of this, $4.9 million is CapEx while $5.6 million is OpEx and just over $1 million is indirect cost. We will now explore how we arrived at these numbers in depth.

TABLE 1: 3 YEAR TCO SUMMARY FOR ABC COMPANY'S INFRASTRUCTURE, BASED ON THE ALINEAN METHODOLOGY

SELF-MANAGED ANNUAL COST DETAILS	YEAR 1	YEAR 2	YEAR 3	TOTAL
CAPITAL COSTS (CAPEX)				
Current server hardware costs	$646,380	$115,920	$120,960	$883,260
Server software license costs	$1,241,225	$124,123	$136,535	$1,501,882
Network infrastructure costs	$73,401	$7,340	$8,074	$88,815
Storage costs	$1,773,300	$301,461	$307,490	$2,382,251
Backup infrastructure costs	$64,200	$11,800	$11,800	$87,800
Total Annual Capital Costs	**$3,798,506**	**$560,644**	**$584,859**	**$4,944,009**

SELF-MANAGED ANNUAL COST DETAILS	YEAR 1	YEAR 2	YEAR 3	TOTAL
OPERATING EXPENSES (OPEX)				
Current server hardware support costs	$65,835	$72,765	$79,695	$218,295
Software support costs	$310,306	$341,337	$375,471	$1,027,114
Network infrastructure support costs	$5,872	$ 6,459	$7,105	$19,437
Storage warranty costs	$169,620	$198,455	$227,868	$595,943
Data center power and facilities cost	$433,958	$433,958	$433,958	$1,301,873
Current system admin labor costs	$693,241	$720,970	$749,809	$2,164,020
IT training costs	$42,420	$42,420	$42,420	$127,260
IT staff turnover costs	$20,224	$20,224	$20,224	$60,671
Network bandwidth costs	$36,000	$36,000	$36,000	$108,000
Total Annual Operating Expenses	**$1,777,475**	**$1,872,588**	**$1,972,549**	**$5,622,612**
INDIRECT BUSINESS COSTS				
Indirect Cost Realization Factor	20%			
Unplanned downtime - productivity impact	$91,097	$91,097	$91,097	$273,291
Planning downtime - productivity impact	$121,324	$121,324	$121,324	$363,972
Business agility - productivity impact	$46,849	$46,849	$46,849	$140,548
Unplanned downtime - business costs	$30,091	$30,091	$30,091	$90,272
Planning downtime - business costs	$32,060	$32,060	$32,060	$96,180
Business agility - revenue impact	$32,185	$32,185	$32,185	$96,556
Total Annual Business Costs	**$353,606**	**$353,606**	**$353,606**	**$1,060,819**
Total	**$5,929,588**	**$2,786,838**	**$2,911,014**	**$11,627,439**

CAPEX VS. OPEX IN THE TCO CATEGORIES

Some of the Alinean TCO categories are purely operational, affecting only OpEx. For example, IT staff salaries are an expense. There is no direct capital investment required to hire people, if you exclude office facilities and the like. Other categories will break out into both a CapEx and OpEx figure. Server hardware, server software, network infrastructure, storage, backup, and power and facilities all contain CapEx and OpEx expenditures. This split occurs because in each of these categories, the purchase of the hardware or software

asset invariably triggers a related, recurring maintenance charge. Typically, the numbers are in proportion. The higher the asset price, the higher the support fee will be. Software maintenance is usually around 25% of the license cost each year, and so on.

Server Hardware

Server hardware costs depend on processor speeds, memory, on-board storage, and other factors. The Server Hardware Appendix shows the pricing and feature detail for the servers acquired by ABC Company in this exercise. The five-year server hardware cost projection shown in Table 2 reflects the assumptions that ABC Company will add servers at a growth rate of 10% a year. In year 1, the company must buy 38 servers, for a CapEx expenditure of $598,500. In years 2 and 3, they buy 4 more servers per year, followed by purchases of 5 servers per year in years 4 and 5. By year 5, ABC Company has 51 servers. Given an assumption of a 36-month replacement cycle for server hardware, the company must purchase 38 replacement machines in year 4. Spare parts are estimated at 8% of purchase cost, an expenditure that starts at $47,880 in year 1 and grows in proportion to the installed base of servers. Total CapEx for server hardware is $646,380 in year 1. CapEx drops in years 2 and 3, but rises again to $741,510 in year 4 as adding servers for growth and replacing aging servers requires a substantial capital outlay.

OpEx for server hardware is based on server maintenance costs. Service contracts, priced at 11% of purchase price, generate an annual OpEx expenditure that starts at $65,835 in year 1 and grows to $97,020 in year 5. Total costs for server hardware, including CapEx and OpEx, are $1,101,555 for the first three years and $2,240,753 for the five-year projection.

TABLE 2: ANNUAL SERVER HARDWARE COSTS

ANNUAL SERVER HARDWARE COSTS	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Number of servers (beginning of year)	0	38	42	46	51
Servers added for growth	38	4	4	5	5
Servers purchased for replacement	0	0	0	38	4
Average purchase price per new server	$15,750	$15,750	$15,750	$15,750	$15,750
Annual server purchase costs	$598,500	$63,000	$63,000	$677,250	$141,750
Annual costs for server spare and replacement parts	$47,880	$52,920	$57,960	$64,260	$70,560
Annual server hardware costs (CapEx)	$646,380	$115,920	$120,960	$741,510	$212,310
Annual server hardware maintenance costs (OpEx)	$65,835	$72,765	$79,695	$88,358	$97,020
Total server hardware costs	**$712,215**	**$188,685**	**$200,655**	**$829,868**	**$309,330**

SERVER SOFTWARE

To run its web application, ABC Company has to purchase server software, including Windows Server operating system software, SQL Server database software, and VMware vSphere software. The details of the license counts and fees are contained in the Server Software Appendix. Software is an asset. Though you can't touch it or see it, software code must be booked as an asset on the corporate balance sheet as a capital expense and depreciated over time just like a forklift or an air conditioner. Acquiring the software for this project requires a CapEx of $1.2 million in year 1. As shown in Table 3, with a 10% annual growth rate in the server install base, software CapEx continues in each subsequent year, starting with $124,123 in year two and growing to $165,207 in year five.

TABLE 3: ANNUAL SERVER SOFTWARE COSTS

ANNUAL SERVER SOFTWARE COSTS	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Annual server software purchase costs (CapEx)	$1,241,225	$124,123	$136,535	$150,188	$165,207
Annual server software support costs (OpEx)	$310,306	$341,337	$375,471	$ 413,018	$454,319
Total server software costs	**$1,551,531**	**$465,459**	**$512,005**	**$ 563,206**	**$619,526**

OpEx for server software is based on ongoing support, which is standard for most enterprise software products. Calculated in this case at 25% of license fees, server support costs total $310,306 in year one. With the growth in the server install base, the server software OpEx grows to $454,319 by year five. The three-year total cost for server software is $2,528,296. The five-year total is $ 3,711,728.

NETWORK INFRASTRUCTURE

The network infrastructure required to connect the web application to all users – internal and external – should be included in the TCO estimate. In the scenario, the new web application will involve the purchase of new network infrastructure equipment. This makes it relatively simple to estimate CapEx and OpEx for the network infrastructure elements of the TCO.

Many companies, however, will already have a network infrastructure in place. A new application will share that infrastructure with other systems already running. Should the costs associated with that network be applied to the TCO for the new application? Yes, it should. This may contradict what is generally known as the "sunk cost" theory of TCO. In this approach, if the system in question has already been paid for, then the cost is "sunk" and should not be considered relevant to any future investments. There may be some financial and accounting merit to this argument, but the best practice is to include the

costs of any IT asset that is employed for a particular use case. The basic rule of the Alinean TCO methodology is that the cost of a shared infrastructure asset should be applied proportionally to the TCO of a proposed use case.

ABC Company's new web application needs firewalls, load balancers, network switches, and an intrusion detection system (IDS.) The specific models and their costs are detailed in the Network Infrastructure Appendix. The initial CapEx outlay for network infrastructure hardware is $73,401, as shown in Table 4. As the server install base grows, additional CapEx continues in each subsequent year, starting at $7,340 in year two and growing to $9,770 in year five. OpEx is based on ongoing maintenance costs and service contracts estimated at 8% of hardware purchase cost. OpEx for network infrastructure grows from $5,872 in year one to $8,597 in year five. The three-year TCO for network infrastructure is $108,252. By the fifth year, the total cost of network infrastructure will be $143,316.

TABLE 4: ANNUAL NETWORK INFRASTRUCTURE COSTS

ANNUAL NETWORK INFRASTRUCTURE COSTS	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Annual network equipment purchase costs (CapEx)	$73,401	$7,340	$8,074	$8,882	$9,770
Annual network equipment maintenance costs (OpEx)	$5,872	$6,459	$7,105	$7,816	$8,597
Total network infrastructure costs	**$79,273**	**$13,799**	**$15,179**	**$16,697**	**$18,367**

STORAGE

ABC Company's web application needs storage, just like any business system. Based on requirements, ABC's IT managers figure they can use three different types of storage hardware: 100,000 GB on an EMC VNX5700 array, 250,000 GB on an EMC Isilon NL400, and 15,000 GB on DAS. The Storage Appendix contains the cost details. The interesting thing about storage as a TCO item is that while storage needs invariably rise over time, the cost per GB for hardware typically falls year by year. In this case, ABC Company is able to project that it will need to add 73,000 GB in year two, 87,600 GB in year three, and so forth. Cost per GB for hardware is projected to decrease from an average of $4.22/GB in year one to $2.21 in year five – a 50% drop! With storage networking costs, calculated at 15% of storage hardware purchase price, the total CapEx for storage is $1.7 million in year one, with supplemental storage purchases totaling over $300,000 per year for the next four years. Storage OpEx, estimated as an 11% support fee for the storage hardware, grows from $169,620 in year one to $288,468 in year five. The three-year TCO for storage is $2.9 million. The five-year TCO is $4.1 million.

TABLE 5: ANNUAL STORAGE COSTS

ANNUAL STORAGE COSTS	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Storage capacity	-	365,000	438,000	525,600	630,720
Storage capacity added for growth (GBs)	365,000	73,000	87,600	105,120	126,144
Average price per GB	$4.22	$3.59	$3.05	$2.59	$2.21
Annual storage purchase costs	$1,542,000	$262,140	$267,383	$272,730	$278,185
Storage networking costs	$231,300	$39,321	$40,107	$40,910	$41,728
Annual storage equipment costs (CapEx)	$1,773,300	$301,461	$307,490	$313,640	$319,913
Annual storage support costs (OpEx)	$169,620	$198,455	$227,868	$257,868	$288,468
Total annual storage costs	**$1,942,920**	**$499,916**	**$535,358**	**$571,508**	**$608,381**

BACKUP INFRASTRUCTURE

Backup is another TCO element that often gets lumped into "sunk costs." Yet, it should definitely be factored into TCO, even if the actual dollar amounts are relatively low. If anything, backup should be included for two reasons beyond the basic costs involved. At one level, backup is a repetitive administrative task. It also appears in the IT staff section of the TCO analysis. However, routine as backup might be, it's actually very important while being prone to error – errors that can be extremely costly if they are not noticed.

TABLE 6: ANNUAL BACKUP COSTS

ANNUAL BACKUP COSTS	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Backup equipment costs (tape drives)	$20,000				
Backup software licenses	$2,000				
Annual backup software support costs	$400	$400	$400	$400	$400
Annual tape media costs	$30,400				
Annual off-site tape storage costs	$11,400	$11,400	$11,400	$11,400	$11,400
Total annual backup infrastructure costs	**$64,200**	**$11,800**	**$11,800**	**$11,800**	**$11,800**

Table 6 summarizes ABC Company's backup TCO. As detailed in the Backup Appendix, a single tape drive can accommodate 5 servers. With 38 servers installed, ABC Company will need 8 tape drives, each costing $2,500. Each server requires its own backup software, with its own support fees. Tape media, that needs to have 2 sets of tapes for each server, comes to $30,400. Backup has a three-year TCO of $87,800, of which $22,000 is CapEx. The five-year TCO is $111,400.

POWER AND FACILITIES

The web application will need to be hosted in a physical data center facility. The facility, and the hardware, will require electrical power to run and cool itself. In this example, we're going to assume that the data center already exists. However, unlike a "sunk cost" that can be ignored in a TCO analysis, the CapEx that went into building the data center in the past will be factored into this analysis as a per-square-foot of floor space cost based on depreciation of the data center asset. In this way, the already-constructed data center will appear in the TCO as OpEx even though its construction was CapEx in an earlier time period.

If a new data center were required for a system, then of course its cost would have to be considered CapEx. Many companies today are building new data centers to handle increases in computing load. It's a costly proposition. A 15,000 square foot data center, which can hold about 460 racks[1], will cost between $4.6 and $18 million[2,3], for basic construction and infrastructure.

The Power & Facilities Appendix details how data center operating costs are determined. There are two basic cost factors: floor space and power. Floor space costs are derived from a combination of building operating overhead and depreciation of the facility construction costs. For instance, if a 15,000 square foot data center costs $10 million to build, and was depreciated over 15 years, which is an industry norm[4], the depreciation charge for data center floor space would be $44 per square foot per year. The Alinean model costs data center floor space at $62 per square foot per year, which adds overhead such as insurance, maintenance, and so forth, to the base depreciation figure.

How much floor space should be assigned to ABC Company's new web application? Based on the size of the hardware required, the analysis shows that the system will use 190 Us of rack space. A U is 1.75" high. Most servers are 1, 2 or 4Us in height. There are 42 Us in a standard 19" wide data center rack. For practical purposes, this analysis assumes that there are 40 usable Us in a rack. Each rack requires 20 square feet of floor space. The web application, with 190 Us, requires 5 racks, for a total of 100 square feet of floor space. As Table 7 shows, this results in an annual floor space charge of $6,200 for hosting the racks for the web application in house.

TABLE 7: ANNUAL DATA CENTER FACILITIES AND POWER COSTS

ANNUAL DATA CENTER FACILITIES COSTS	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Annual costs for data center floor space	$6,200	$6,200	$6,200	$6,200	$6,200
Annual data center energy costs	$90,235	$90,235	$90,235	$90,235	$90,235
Data center addition cost factor	4.5	4.5	4.5	4.5	4.5
Annual data center facilities costs	**$433,958**	**$433,958**	**$433,958**	**$433,958**	**$433,958**

Energy costs in the data center are estimated using two criteria. First, there is the power consumption required to run whatever system is being analyzed for TCO. Each piece of hardware uses power differently. For example, in this case, the 2 x hex-core/256GB servers use 620 watts. Over the course of a year, the hardware used by the web application will need 45,750 Kilowatt Hours of electricity.

Then there's the energy used to power the rest of the data center, including lighting, cooling, and supplemental systems. The two figures are connected by a factor known as "Power Usage Effectiveness" or PUE, which is the ratio between system-specific energy use and general-purpose power use in a data center. The lower the PUE, the more energy efficient the data center is. In the most advanced data centers in the world, the PUE hovers around 1.2. This means that for every watt used to power an actual server, another 1.2 watts is required to cool the place down and keep the lights on. In this analysis, we assume a PUE of 2.5, which is standard in the industry. Applying this PUE to the 45,750 KwHours needed for the system hardware, the overall power use for the system will be just over 1 million KwHours per year. At a cost of nine cents per KwHour, that comes to an annual energy cost for ABC Company of $90,235. The total data center facilities and power cost, after multiplying by Alinean's add-on factor of 4.5 to account for corporate overhead and many other related expenses, comes to $433,958 per year of OpEx. The three-year total is $1,301,873. Five years is $2,169,788.

IT LABOR COSTS

People costs are the largest OpEx category. This makes sense because IT is an inherently human activity. It's important to get the full measure of staffing costs too. Salaries and benefits are not the only cost items that need to be tracked. The Alinean model also factors in training and turnover costs. Unlike equipment or code, people are not static. People change jobs. They have to learn new skills. They leave. The costs of these circumstances must be modeled and analyzed for their impact on TCO.

System Administration Staff

Each component of ABC Company's web application needs to be administered at least part of the time. In some cases, a person with many duties might devote a fraction of his or her time to the web application. In other parts of the system, one or more full time people will be required to keep it running smoothly. The TCO analysis for system administration staff is detailed in the System Admin Labor Appendix. It calculates how many full-time employees (FTEs) are needed to oversee the servers, network, databases, storage, and so forth. A person who only spends part of his or her time on the system is estimated as a fraction of an FTE. For instance, if an IT staffer spends one quarter of his or her time on the web application, the TCO analysis counts that as .25 FTEs.

TABLE 8: ANNUAL IT LABOR COSTS

IT LABOR COSTS	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Average fully-burdened salary	$110,741	$115,171	$119,778	$124,569	$129,552
System admin labor costs	$693,241	$720,970	$749,809	$779,801	$810,993
System admin staff (FTEs)	6.26	6.26	6.26	6.26	6.26
System administration efforts (hours)	**11,268**	**11,268**	**11,268**	**11,268**	**11,268**

Different administrator types earn different salaries. In this analysis, we estimate that a server administrator earns $83,385 a year while a database administrator earns $93,195. These figures are based on standard industry salaries from the Alinean TCO methodology. With taxes and benefits, the "fully burdened" salary averages $110,741 per year. As shown in Table 8, with 6.26 FTEs required for the web application, the system admin labor costs total $693,241 in year one.

Training and Turnover

The Alinean model assumes that IT staff members will receive either 40 or 80 hours per year for training, as detailed in the IT Training Costs Appendix. At a rate of $3,500 per 40 hour training unit, the IT staff required to run ABC Company's web application will accrue training costs of $42,420 per year. Table 9 summarizes the costs and hours involved.

TABLE 9: ANNUAL IT TRAINING COSTS

	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
IT training costs	$ 42,420	$ 42,420	$ 42,420	$ 42,420	$42,420
IT training hours	485	485	485	485	485

Staff turnover is estimated at 15% per year, which means that ABC Company will be replacing .94 FTEs per year for its web application. Recruitment costs run 20% of the fully-burdened salary, or $16,716 per year. Adding on-boarding costs equivalent to three weeks' salary, the total cost of IT staff turnover will be $20,224 annually. A detailed look at these costs is found in the Staff Turnover Costs Appendix.

TABLE 10: ANNUAL IT STAFF TURNOVER COSTS

	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
IT staff turnover costs	$ 20,224	$ 20,224	$ 20,224	$ 20,224	$ 20,224

Network Bandwidth

The web application will use a portion of ABC Company's network bandwidth. A pro-rata share of the bandwidth cost should be applied to OpEx. The

Network Bandwidth Costs Appendix outlines how each server requires 350 Mbps of bandwidth. At that rate, ABC Company has to provision the equivalent of 8 T-1 Lines, each with 1.54 Mbps of bandwidth. Costing $375 per month, these lines will add OpEx of $36,000 per year.

TABLE 11: ANNUAL NETWORK BANDWIDTH COSTS

	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Number of T-1 lines required	8.00	8.00	8.00	8.00	8.00
Total annual network bandwidth costs	$36,000	$36,000	$36,000	$36,000	$36,000

INDIRECT COSTS

TCO should include an estimate of indirect costs of hosting a system in-house. Indirect costs include unplanned downtime, planned downtime, and business agility. Each of these indirect cost categories has a real impact on a business's financial picture even if they can be somewhat challenging to measure. Indirect costs estimation tends to be more subjective and assumption-based than the clear-cut dollars and cents of the hardware/software/network types of TCO elements. However, based on our experience, we've found that outsourced hosting delivers better indirect cost performance, as detailed in the Indirect Cost Appendix and summarized in Table 12.

TABLE 12: INDIRECT BUSINESS COSTS

INDIRECT BUSINESS COSTS	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
CURRENT SELF-MANAGED COSTS					
Unplanned downtime - productivity impact	$455,485	$455,485	$455,485	$455,485	$455,485
Planned downtime - productivity impact	$606,620	$606,620	$606,620	$606,620	$606,620
Business agility - productivity impact	$234,247	$234,247	$234,247	$234,247	$234,247
Unplanned downtime - business costs (Revenue opportunity cost)	$150,453	$150,453	$150,453	$150,453	$150,453
Planned downtime - business costs (Revenue opportunity cost)	$160,300	$160,300	$160,300	$160,300	$160,300
Business agility - revenue impact (Lost revenue opportunity)	$160,927	$160,927	$160,927	$160,927	$160,927
Total self-managed costs	$1,768,032	$1,768,032	$1,768,032	$1,768,032	$1,768,032
Indirect benefit realization factor	20%	20%	20%	20%	20%
Total realized costs	**$353,606**	**$353,606**	**$353,606**	**$353,606**	**$353,606**

INDIRECT BUSINESS COSTS	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
COSTS WITH HOSTED SOLUTION					
Unplanned downtime - productivity impact	$151,828	$151,828	$151,828	$151,828	$151,828
Planned downtime - productivity impact	$121,324	$121,324	$121,324	$121,324	$121,324
Business agility - productivity impact	$15,616	$15,616	$15,616	$15,616	$15,616
Unplanned downtime - business costs (Revenue opportunity cost)	$50,151	$50,151	$50,151	$50,151	$50,151
Planned downtime - business costs (Revenue opportunity cost)	$32,060	$32,060	$32,060	$32,060	$32,060
Business agility – revenue impact (Revenue opportunity cost)	$10,728	$10,728	$10,728	$10,728	$10,728
Total hosted costs	$381,708	$381,708	$381,708	$381,708	$381,708
Indirect benefit realization factor	20%	20%	20%	20%	20%
Total realized costs	**$76,342**	**$76,342**	**$76,342**	**$76,342**	**$76,342**
Total improved service level benefits	**$277,265**	**$277,265**	**$277,265**	**$277,265**	**$277,265**

The financial impact of both planned and unplanned downtime can be estimated by calculating the number of worker hours that are lost to system outages. Outsourced solutions typically have a higher rate of uptime and less planned downtime, so as a result they reduce the impact of downtime on productivity. Outsourced solutions can also speed up planned downtime cycles, which reduces the revenue opportunity cost associated with having systems offline.

This analysis measures business agility by the rate at which the company can develop and deploy new applications. The faster the applications can be put into production and contribute to revenue growth, the more financial benefit the company will gain. A revenue-enhancing application whose deployment is delayed results in an opportunity cost of lost revenue. In this case, as shown in the Appendix, the ability to provision applications in two days instead of 30 reduces the $160,927 revenue opportunity cost by $150,199, to $10,728. We'll talk more about agility using time to market as an example in the Outsource, or Not? section.

ESTIMATING THE TCO DIFFERENTIAL FROM OUTSOURCING

The actual cost of outsourcing will vary depending on many factors in your particular use case. In our experience, however, we have generally seen that outsourcing costs about 90% as much as the combined CapEx and OpEx

for a particular infrastructure project. The outsourcing cost is OpEx. Table 13 summarizes the five-year outlook for in-house vs. outsourced using this 90% comparison metric.

TABLE 13: TOTAL CAPEX AND OPEX OF IN-HOUSE HOSTING VS. OUTSOURCING (90% OF CAPEX/OPEX) OVER 5 YEARS

	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	TOTAL
In-house	$5,575,981	$2,433,232	$2,557,408	$3,305,481	$2,910,999	$16,783,100
Outsourced	$3,169,986	$3,169,986	$3,169,986	$3,169,986	$3,169,986	$15,849,930

For ABC Company, as shown in Table 14, outsourcing might save $1 million over the three-year time horizon and $1.6 million over five years. For the sake of simplicity, we have set aside indirect business costs, but they too, favor outsourcing due to efficiencies of administration at the outsourcing provider. The annual OpEx outlay will be higher with outsourcing, but ABC Company will save $3.8 million in CapEx in year one.

TABLE 14: IN-HOUSE VS. OUTSOURCE FINANCIAL COMPARISON

	THREE YEAR		FIVE YEAR	
	IN-HOUSE	OUTSOURCED	IN-HOUSE	OUTSOURCED
CapEx	$4,944,009	$ -	$6,889,028	
OpEx	$5,622,612	$9,509,958	$9,894,072	$15,104,790
Total	$10,566,620	$9,509,958	$16,783,100	$15,104,790
Savings from outsourcing	$1,056,662		$1,678,310	
Year 1 CapEx savings	**$3,798,506**			

OUTSOURCE, OR NOT?

Outsourcing TCO tends to be lower than that needed for hosting in-house. That is an argument in favor of outsourcing, though not in every case. The decision to outsource should relate to many distinct factors that affect how your business operates. In practical terms, some workloads will be more suitable for outsourcing than others. Most organizations start with a good outsourcing candidate and then migrate more workloads as the IT staff becomes more familiar with the process. Read the Choosing a Workload to Outsource white paper for guidance on migrating workloads.

Financially, the savings on CapEx is a compelling argument in favor of outsourcing. ABC Company's $3.8 million capital savings in year one is significant and will be meaningful to the people responsible for managing ABC Company's assets on behalf of its shareholders. That is $3.8 million that could be used for other business investment purposes. There's also a risk

reduction benefit to offloading the capital investment to a third party. Not only is there the high opportunity cost of putting down large capital outlays on infrastructure, but the risks associated with those purchases are high as well. If the infrastructure does not deliver the desired business results, the capital will have been wasted or put to sub-optimal use. These kinds of problems show up indirectly in financial results and share prices.

Another way to look at the benefit of CapEx savings is to estimate the cost of that capital to the company. Capital comes at a cost to the business. Most financial executives evaluate capital expenses based on a "cost of equity capital" criteria to determine if an investment is worth making. Cost of capital varies by industry, but the average, according to the accounting firm KPMG, is 9.1%[5]. That means that most companies will assume that any CapEx is costing them 9.1% a year, as if they were paying interest on a loan. For ABC Company, the $3.8 million CapEx for the web application would accrue a capital cost charge of $345,664 per year on top of the other costs. The cost of capital charge further widens the gap between in-house and outsourced hosting. If ABC Company has to borrow money to invest in the infrastructure, it would probably use the average cost of debt of 4.5%, which is the current average of high-grade corporate bonds[6]. At that rate, the web application would need to tack about $170,000 a year onto its TCO for interest expense.

Finally, it's worth pointing out a number of intangible benefits that arise from outsourcing. These intangibles are difficult to quantify in dollar terms, but they are meaningful to the business in any event. Time to market is an example of subjective, intangible benefit of outsourcing. The ability to provision IT systems that support new business initiatives rapidly can bring strong strategic and financial rewards to a business. The opposite is also true. If IT contributes to a lag in the launch of a new product or service, then that will be detrimental to the bottom line.

The "asset value" of the IT staff is an intangible aspect of the outsourcing question. While staffing is OpEx, it is also a useful exercise to think about IT staff as an asset of the business. This goes beyond HR talk about "people are an asset" and so forth – it's about understanding that IT salaries are an investment in the business. Like any investment, they can be analyzed for their rates of return. What is the investment in IT salaries yielding for the business? Is the investment being used to "keep the lights on," as is the case with many IT departments? Or, is the investment yielding valuable, strategic returns for the business?

Capacity planning is another serious intangible factor to assess when making the outsourcing decision. In today's IT world, where new form factors, such as tablets and mobile devices, can cause rapid, unpredictable growth in compute demand, the ability to outsource capacity takes a lot of pressure off of IT capacity planners. If your data center is already reaching its capacity, it can be a major challenge to figure out how much new on-premise capacity you will

need over the next few years. Given the high costs of data center construction, having an outsource option can be a big advantage.

CONCLUSION

Making the decision to outsource infrastructure can be complex and challenging. However, it can be a clear and informative process. With an accurate TCO analysis, which Rackspace can provide you through its customized Alinean methodology, you will be able to make the decision using numbers that are true and relevant to your specific company situation. As this paper has shown, the best outsourcing decisions arise from gaining a deep, thorough understanding of your actual costs of running infrastructure in-house. An appreciation for the differences between the CapEx and OpEx sides of the TCO figure will also drive discussion about the best use of capital. The IT manager is responsible for delivering the best possible return on IT assets to shareholders. The approach to TCO analysis in this paper is designed to give you the tools you need to become a great manager of the shareholders' IT assets that are under your control.

As one of the largest VMware Service Provider Program (VSPP) partners, Rackspace has expert VMware Certified Professionals available and experience that comes with managing over 45,000 VMs. For information about how Rackspace can conduct the type of TCO analysis depicted in this paper, please visit http://www.rackspace.com/enterprise-cloud-solutions/advisory-services/#tco-workshop.

ABOUT RACKSPACE

Rackspace® (NYSE: RAX) is the global leader in hybrid cloud and founder of OpenStack®, the open-source operating system for the cloud. Hundreds of thousands of customers look to Rackspace to deliver the best-fit infrastructure for their IT needs, leveraging a product portfolio that allows workloads to run where they perform best—whether on the public cloud, private cloud, dedicated servers, or a combination of platforms. The company's award-winning Fanatical Support® helps customers successfully architect, deploy and run their most critical applications. Headquartered in San Antonio, TX, Rackspace operates data centers on four continents Rackspace is featured on Fortune's list of 100 Best Companies to Work For.

For more information, visit www.Rackspace.com.

Appendices

SERVER HARDWARE

SERVER TYPE	UNITS	AVERAGE COST PER SERVER	TOTAL NEW SERVER PURCHASE COSTS	ANNUAL HARDWARE MAINTE-NANCE	HARDWARE MAINTE-NANCE AS % OF HARD-WARE COSTS
2 x hex-core processors and 256GB of RAM	10	$8,500	$85,000	$935	11%
4 x octa-core processors and 256GB of RAM	25	$20,000	$500,000	$2,200	11%
1 x hex-core processor and 32GB of RAM	1	$5,500	$5,500	$605	11%
1 x hex-core processor and 32GB of RAM	1	$5,500	$5,500	$605	11%
Management server (VMware vCenter Server)	1	$2,500	$2,500	$275	11%
			$ -	$ -	11%
			$ -	$ -	11%
Total new server purchase costs and annual maintenance	**38**	**$15,750**	**$598,500**	**$65,835**	

Average annual costs for server spare and replacement parts	$47,880	8% of total purchase
Average annual growth in server requirements	10%	(Figure flows through whole sheet)
Average annual growth in server purchase costs	0%	
Average server refresh period	36 months	

ANNUAL SERVER HARDWARE COSTS	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Number of servers (beginning of year)	0	38	42	46	51
Servers added for growth	38	4	4	5	5
Servers purchased for replacement	0	0	0	38	4
Average purchase price per new server	$15,750	$15,750	$15,750	$15,750	$15,750
Annual server purchase costs	$598,500	$63,000	$63,000	$677,250	$141,750
Annual costs for server spare and replacement parts	$47,880	$52,920	$57,960	$64,260	$70,560
Annual server hardware costs (CapEx)	$646,380	$115,920	$120,960	$741,510	$212,310
Annual server hardware maintenance costs (OpEx)	$65,835	$72,765	$79,695	$88,358	$97,020
Total server hardware costs	**$712,215**	**$188,685**	**$200,655**	**$829,868**	**$309,330**

SERVER SOFTWARE

SERVER SOFTWARE LICENSES	SERVERS	LICENSES	COST PER LICENSE	TOTAL LICENSE COSTS	ANNUAL SUPPORT
OPERATING SYSTEM					
> Windows Server Standard Edition	10	20	$1,209	$24,180	$6,045
> Windows Server Enterprise Edition			$3,919	$ -	$ -
> Windows Server Database Edition	25	100	$2,999	$299,900	$ 74,975
> Red Hat® Linux			$1,819	$ -	$ -
> CentOS			$909	$ -	$ -
VIRTUALIZATION SOFTWARE					
> VMware vSphere (ESXi)	26	101	$2,875	$ 290,375	$72,594
> VMware vCenter Server (Management)	1	1	$4,995	$4,995	$1,249
DATABASE					
> SQL Server Standard			$8,017	$ -	$ -
> SQL Server Enterprise	10	20	$30,739	$614,780	$153,695
> Oracle® Standard				$ -	$ -
> Oracle Enterprise				$ -	$ -
> Oracle RAC				$ -	$ -
> MySQL				$ -	$ -
COLLABORATION SOFTWARE					
> Microsoft Exchange (no CALs)	1	1	$1,000	$1,000	$250
> Microsoft SharePoint® (no CALs)	1	1	$5,995	$5,995	$1,499
Total				**$1,241,225**	**$310,306**

ANNUAL SERVER SOFTWARE COSTS	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Annual server software purchase costs (CapEx)	$1,241,225	$124,123	$136,535	$150,188	$165,207
Annual server software support costs (OpEx)	$310,306	$341,337	$375,471	$413,018	$454,319
Total server software costs	**$1,551,531**	**$465,459**	**$512,005**	**$563,206**	**$619,526**

Average annual growth rate in server requirements	10%

NETWORK INFRASTRUCTURE

NETWORK INFRASTRUCTURE EQUIPMENT	QUANTITY	AVERAGE COST PER DEVICE	TOTAL PURCHASE COSTS	ANNUAL HARDWARE MAINTE-NANCE
FIREWALLS				
ASA 5555-X	2	$ 1,373	$22,746	$1,820
Imperva WAF	1	5675	$5,675	$454
Load balancers				
F5 BIG-IP 3600	2	14,540	$29,080	$2,326
Additional infrastructure				
Intrusion Detection (IDS)	1	8,700	$8,700	$696
Network switches	4	1,800	$7,200	$576
Total	**10**		**$73,401**	**$5,872**

Average annual growth in server requirements	10%

ANNUAL NETWORK INFRASTRUCTURE COSTS	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Annual network equipment purchase costs (CapEx)	$73,401	$7,340	$8,074	$8,882	$9,770
Annual network equipment maintenance costs (OpEx)	$5,872	$6,459	$7,105	$7,816	$8,597
Total network infrastructure costs	**$79,273**	**$13,799**	**$15,179**	**$16,697**	**$18,367**

STORAGE

STORAGE TYPE	CAPACITY (GBS)	AVERAGE COST PER GB	TOTAL STORAGE PURCHASE COSTS	ANNUAL SUPPORT
FIREWALLS				
EMC VNX5700	100,000	$4.72	$472,000	$51,920
EMC Isilon NL400	250,000	$4.16	$1,040,000	$114,400
IBM® DS3512 DAS	15,000	$2.00	$30,000	$3,300
Total	**365,000**	**$4.22**	**$1,542,000**	**$169,620**

Average annual decrease in price per TB of storage	15%
Average annual growth in storage capacity	20%

ANNUAL STORAGE COSTS	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Storage capacity (GBs at beginning of year)	-	365,000	438,000	525,600	630,720
Storage capacity added for growth (GBs)	365,000	73,000	87,600	105,120	126,144
Average price per GB	$4.22	$3.59	$3.05	$2.59	$2.21
Annual storage purchase costs	$1,542,000	$62,140	$267,383	$272,730	$278,185
Storage networking costs	$231,300	$39,321	$40,107	$40,910	$41,728
Annual storage equipment costs (CapEx)	$1,773,300	$301,461	$307,490	$313,640	$319,913
Annual storage support costs (OpEx)	$169,620	$198,455	$227,868	$257,868	$288,468
Total annual storage costs	**$1,942,920**	**$499,916**	**$535,358**	**$571,508**	**$608,381**

BACKUP

Total number of servers	38	
Average number of servers per backup tape drive	5	
Average purchase price per tape drive	$2,500	
Purchase costs for tape drives	$20,000	
Average backup software cost per server	$250	
Backup software license costs	$2,000	
Backup software support	20%	per year
Average number of tapes per server	10	
Average cost per tape	$80.00	
Tape media costs	$30,400	
Is off-site tape storage required?	Yes	
Number of tapes stored off site	76	2 per server
Annual costs for off-site tape storage	$11,400	@ $150 per tape
Average annual growth in server requirements	10%	

ANNUAL BACKUP COSTS	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Backup equipment costs (tape drives)	$20,000				
Backup software licenses	$2,000				
Annual backup software support costs	$400	$400	$400	$400	$400
Annual tape media costs	$30,400				
Annual off-site tape storage costs	$11,400	$11,400	$11,400	$11,400	$11,400
Total annual backup infrastructure costs	**$64,200**	**$11,800**	**$11,800**	**$11,800**	**$11,800**

POWER AND FACILITIES

DEVICE TYPE	NUMBER OF DEVICES	AVERAGE RACK SPACE (US)	TOTAL RACK SPACE (US)	AVERAGE POWER (WATTS)	TOTAL POWER (WATTS)
FIREWALLS					
2 x hex-core processors and 256GB of RAM	10	2.00	20.00	620	6,200
4 x octa-core processors and 256GB of RAM	25	4.00	100.00	1,000	25,000
1 x hex-core processor and 32GB of RAM	1	1.00	1.00	450	450
1 x hex-core processor and 32GB of RAM	1	1.00	1.00	450	450
Management server (VMware vCenter Server)	1	1.00	1.00	250	250
NETWORK EQUIPMENT					
ASA 5555-X	2	1.00	2.00	800	1,600
Imperva WAF	1	2.00	2.00	800	800
F5 BIG-IP 3600	2	1.00	2.00	350	700
Intrusion Detection (IDS)	1	1.00	1.00	350	350
STORAGE DEVICES					
EMC VNX5700	8	5.00	40.00	1,200	9,600
EMC Isilon NL400	1	20.00	20.00	350	350
Total	**53**	**3.55**	**190**	**863.21**	**45,750**

ASSUMPTION			
Average annual growth in server requirements	10%	40	Us of usable rack space per rack
		20	Sq. feet of floor space per rack

ANNUAL DATA CENTER FACILITIES COSTS	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
DATA CENTER FLOOR SPACE COSTS					
Data center requirements (Us)	190.00	190.00	190.00	190.00	190.00
Square feet of data center floor space	100.00	100.00	100.00	100.00	100.00
Average annual cost per square foot of floor space	$62	$62	$ 62	$62	$62
Annual costs for data center floor space	**$6,200**	**$6,200**	**$6,200**	**$6,200**	**$6,200**
DATA CENTER POWER AND COOLING COSTS					
Average power consumption per hour	45,750	45,750	45,750	45,750	45,750
Operating hours per year	8,766	8,766	8,766	8,766	8,766
Annual power consumption (kWatts)	401,045	401,045	401,045	401,045	401,045
Data center PUE factor	2.5	2.5	2.5	2.5	2.5
Total annual data center power and cooling (kWatts)	**1,002,611**	**1,002,611**	**1,002,611**	**1,002,611**	**1,002,611**
Average cost per kWatt/hour	$0.090	$0.090	$0.090	$0.090	$0.090
Annual data center energy costs	90,235	90,235	90,235	90,235	90,235
Data center addition cost factor	4.5	4.5	4.5	4.5	4.5
Annual data center facilities costs	$433,958	$433,958	$433,958	$433,958	$433,958

SYSTEM ADMIN LABOR

SYSTEMS ADMINISTRATION STAFF	NUMBER OF STAFF (FTES)	AVERAGE ANNUAL SALARY	FULLY-BURDENED COST PER FTE	TOTAL ANNUAL COSTS (YEAR 1)	
Server administrators	3.00	$83,385	$110,485	$331,455	32.5%
Network and security administrators	0.43	$83,385	$110,485	$47,509	
Database administrators	1.23	$93,195	$123,483	$151,885	
Storage administrators	1.20	$79,800	$105,735	$126,882	
Backup administrators	0.40	$67,000	$88,775	$35,510	
Exchange/SharePoint administrators	-	$78,900	$104,543	$ -	
Total	**6.26**	**$83,578**	**$110,741**	**$693,241**	
Average annual increase in system admin effort	0%		Fully burdened labor rate		$ 61.52
Average annual increase in system admin salaries	4%				
Hours worked per year	1800				

ANNUAL COSTS	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Average fully-burdened salary	$110,741	$115,171	$119,778	$124,569	$129,552
System admin labor costs	$693,241	$720,970	$749,809	$779,801	$810,993
System admin staff (FTEs)	6.26	6.26	6.26	6.26	6.26
System administration efforts (hours)	**11,268**	**11,268**	**11,268**	**11,268**	**11,268**

IT TRAINING COSTS

SYSTEMS ADMINISTRATION STAFF	NUMBER OF STAFF (FTES)	AVERAGE HOURS OF TRAINING PER YEAR	AVERAGE ANNUAL COURSE FEES AND EXPENSES	TOTAL ANNUAL TRAINING COSTS (YEAR 1)
Server administrators	3.00	80.00	$7,000	$21,000
Network and security administrators	0.43	80.00	$7,000	$3,010
Database administrators	1.23	80.00	$7,000	$8,610
Storage administrators	1.20	80.00	$7,000	$8,400
Backup administrators	0.40	40.00	$3,500	$1,400
Total	**6.26**	**484.80**		**$42,420**
Average annual increase in system admin effort	5%			

ANNUAL COSTS	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
IT training costs	$ 42,420	$ 42,420	$ 42,420	$ 42,420	$42,420
IT training hours	485	485	485	485	485

STAFF TURNOVER COSTS

Number of IT systems admin staff	6.26	
Average annual turnover rate for IT staff	15%	
Number of new IT staff per year	0.94	
Average annual fully burdened salary	$83,578	
Average recruitment cost per position	$16,716	20%
Average on-boarding period for IT staff	3.00	weeks
On-boarding costs	$4,822	
Total annual IT staff turnover costs (year 1)	$20,224	
Average annual increase in system admin effort	0%	

ANNUAL COSTS	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
IT staff turnover costs	$ 20,224	$ 20,224	$ 20,224	$ 20,224	$ 20,224

NETWORK BANDWIDTH COSTS

PREFERRED WAN CONNECTION TYPE	T-1 (1.54 MBPS)
Available bandwidth per T-1	1.54
Average cost per month per T-1	$375.00
Number of servers	35
Average bandwidth requirements per server (Mbps)	350
Number of T-1 lines required (year 1)	8
Annual network bandwidth costs (year 1)	$36,000
Average annual growth rate in server requirements	10%

ANNUAL COSTS	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Number of T-1 lines required	8.00	8.00	8.00	8.00	8.00
Total annual network bandwidth costs	$36,000	$36,000	$36,000	$36,000	$36,000

INDIRECT BUSINESS COSTS

INDIRECT BUSINESS COSTS	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
CURRENT SELF-MANAGED COSTS					
Unplanned downtime - productivity impact	$455,485	$455,485	$455,485	$455,485	$455,485
Planned downtime - productivity impact	$606,620	$606,620	$606,620	$606,620	$606,620
Business agility - productivity impact	$234,247	$234,247	$234,247	$234,247	$234,247
Unplanned downtime - business costs	$150,453	$150,453	$150,453	$150,453	$150,453
Planned downtime - business costs	$160,300	$160,300	$160,300	$160,300	$160,300
Business agility - revenue impact	$160,927	$160,927	$160,927	$160,927	$160,927
Total self-managed costs	**$1,768,032**	**$1,768,032**	**$1,768,032**	**$1,768,032**	**$1,768,032**
Indirect benefit realization factor	20%	20%	20%	20%	20%
Total realized costs	$353,606	$353,606	$353,606	$353,606	$353,606
COSTS WITH HOSTED SOLUTION					
Unplanned downtime - productivity impact	$151,828	$151,828	$151,828	$151,828	$151,828
Planned downtime - productivity impact	$121,324	$121,324	$121,324	$121,324	$121,324
Business agility - productivity impact	$15,616	$15,616	$15,616	$15,616	$15,616
Unplanned downtime - business costs	$50,151	$50,151	$50,151	$50,151	$50,151
Planned downtime - business costs	$32,060	$32,060	$32,060	$32,060	$32,060
Business agility - revenue Impact	$10,728	10,728	$10,728	$10,728	$10,728
Total hosted costs	**$381,708**	**$381,708**	**$381,708**	**$381,708**	**$381,708**
Indirect benefit realization factor	20%	20%	20%	20%	20%
Total realized costs	**$76,342**	**$76,342**	**$76,342**	**$76,342**	**$76,342**
Total improved service level benefits	**$277,265**	**$277,265**	**$277,265**	**$277,265**	**$277,265**

UNPLANNED DOWNTIME - PRODUCTIVITY IMPACT

UNPLANNED DOWNTIME	SELF-MANAGED ENVIRONMENT	HOSTED SOLUTION	EXPECTED BENEFITS WITH PROPOSED SOLUTION
Average annual system availability	99.70%	99.90%	67%
Average hours of annual unplanned system downtime per year	26.3	8.8	17.5
Average number of knowledge workers impact per outage	1,000	1,000	
Average productivity impact on knowledge workers during outage	40%	40%	
Annual productivity losses due to availability issues (hours)	10,512	3,504	7,013
Average fully burdened hour wage for knowledge workers	43.33	$43.33	
Annual cost of productivity losses due to availability issues	$455,485	$151,828	$303,900

PLANNED DOWNTIME - PRODUCTIVITY IMPACT

PLANNED DOWNTIME	SELF-MANAGED ENVIRONMENT	HOSTED SOLUTION	EXPECTED BENEFITS WITH PROPOSED SOLUTION
Annual hours of planned system downtime per year	140	28	80%
Average number of knowledge workers impact per outage	250	250	
Average productivity impact on knowledge workers during outage	40%	40%	
Annual productivity losses due to availability issues (hours)	14,000	2,800	11,200
Average fully burdened hour wage for knowledge workers	43.33	$43.33	
Annual cost of productivity losses due to availability issues	$606,620	$121,324	$485,296

ANNUAL COSTS	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Current (as is) costs	$606,620	$606,620	$606,620	$606,620	$606,620
Proposed (to be) costs	$121,324	$121,324	$121,324	$121,324	$121,324
Reduction in productivity losses from improved availability	$485,296	$485,296	$485,296	$485,296	$485,296
FTE productivity improvements	**6.2**	**6.2**	**6.2**	**6.2**	**6.2**

BUSINESS AGILITY - PRODUCTIVITY IMPACT			
BUSINESS AGILITY	SELF-MANAGED ENVIRONMENT	HOSTED SOLUTION	EXPECTED BENEFITS WITH PROPOSED SOLUTION
New application projects per year	19	19	
Average system provision time per application (days)	30	2	93.3%
Average annual value in productivity improvement per app	$150,000	$150,000	
Average lost productivity improvement value per system provisioning	$12,329	$822	$11,507
Annual value of productivity losses due to system provisioning	$234,246.58	$15,616.44	$218,630.14

BUSINESS AGILITY - PRODUCTIVITY IMPACT	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Current (as is) costs	$234,247	$234,247	$234,247	$234,247	$234,247
Proposed (to be) costs	$15,616	$15,616	$15,616	$15,616	$15,616
Reduction in productivity losses from improved availability	$218,630	$218,630	$218,630	$218,630	$218,630

UNPLANNED DOWNTIME - BUSINESS COSTS			
UNPLANNED DOWNTIME	**SELF-MANAGED ENVIRONMENT**	**HOSTED SOLUTION**	**EXPECTED BENEFITS WITH PROPOSED SOLUTION**
Average annual system availability	99.70%	99.90%	67%
Average hours of annual unplanned system downtime per year	26.3	8.8	17.5
Estimated revenue or equivalent cost/ hour of unplanned downtime	$25,000	$25,000	$25,000
Annual business losses due to availability issues	$657,000	$219,000	$438,000
Net incremental contribution	22.90%	22.90%	22.90%
Annual incremental margin contribution	**$150,453**	**$50,151**	**$100,302**

ANNUAL COSTS	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Current (as is) costs	$657,000	$657,000	$657,000	$657,000	$657,000
Incremental margin contribution	$150,453	$150,453	$150,453	$150,453	$150,453
Proposed (to be) costs	$219,000	$219,000	$219,000	$219,000	$219,000
Incremental margin contribution	$50,151	$50,151	$50,151	$50,151	$50,151
Reduction in business loss from improved availability	$438,000	$438,000	$438,000	$438,000	$438,000
Incremental margin contribution	**$100,302**	**$100,302**	**$100,302**	**$100,302**	**$100,302**

PLANNED DOWNTIME - BUSINESS COSTS			
PLANNED DOWNTIME	**SELF-MANAGED ENVIRONMENT**	**EXPECTED PLANNED DOWNTIME FOR HOSTED SOLUTION**	**EXPECTED BENEFITS WITH PROPOSED SOLUTION**
Average hours of annual planned system downtime per year	140.0	28.0	80%
Estimated revenue or equivalent cost/ hour of planned downtime	$5,000	$5,000	$25,000
Annual business losses due to availability issues	$700,000	$140,000	$560,000
Net incremental contribution	22.90%	22.90%	22.90%
Annual incremental margin contribution	**$160,300**	**$32,060**	**$128,240**

ANNUAL COSTS	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Current (as is) costs	$700,000	$700,000	$700,000	$700,000	$700,000
Incremental margin contribution	$160,300	$160,300	$160,300	$160,300	$160,300
Proposed (to be) costs	$140,000	$140,000	$140,000	$140,000	$140,000
Incremental margin contribution	$32,060	$32,060	$32,060	$32,060	$32,060
Reduction in business loss from improved availability	$560,000	$560,000	$560,000	$560,000	$560,000
Incremental margin contribution	**$128,240**	**$128,240**	**$128,240**	**$128,240**	**$128,240**

BUSINESS AGILITY - REVENUE IMPACT			
BUSINESS AGILITY	**SELF-MANAGED ENVIRONMENT**	**EXPECTED PLANNED DOWN-TIME FOR HOSTED SOLUTION**	**EXPECTED BEN-EFITS WITH PRO-POSED SOLUTION**
New application projects per year	19	19	
Average system provision time per application (days)	30 days	2 days	93.3%
Average annual revenue value per app	$450,000	$450,000	
Average lost revenue per system provisioning	36,986	2,466	$34,521
Annual value of potential revenue losses due to system provisioning	$702,740	$46,849	$655,890
Net incremental contribution	22.9%	22.9%	22.9%
Annual incremental margin contribution	**$160,927**	**$10,728**	**$150,199**

BUSINESS AGILITY - REVENUE IMPACT	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Current (as is) costs	$702,740	$702,740	$702,740	$702,740	$702,740
Incremental margin contribution	$160,927	$160,927	$160,927	$160,927	$160,927
Proposed (to be) costs	$46,849	$46,849	$46,849	$46,849	$46,849
Incremental margin contribution	$10,728	$10,728	$10,728	$10,728	$10,728
Reduction in business loss from system provisioning	$655,890	$655,890	$655,890	$655,890	$655,890
Incremental margin contribution	**$150,199**	**$150,199**	**$ 150,199**	**$150,199**	**$150,199**

NOTES

1 : Marcus Blosch and Saul Brand, “Gartner’s 2013 CIO Survey Provides Keys to EA Success,” Gartner, 19 July 2013.

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