Quantifying the Total Cost of Upgrading OpenVMS VAX Systems to HP OpenVMS AlphaServer Systems

A Detailed Analysis of the Benefits Realized and Satisfaction Achieved by Upgrading VAX Environments To HP AlphaServer Systems Running OpenVMS

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Version 1b

OpenVMS VAX to OpenVMS AlphaServer Upgrades

Executive Summary

Since its introduction 23 years ago, more than one-half million VAX systems have been sold. However, like all computing architectures, the VAX could not remain on the leading edge of technology forever. Several years ago, an announcement was made regarding an end-of-ship date for the VAX. Since the introduction of the AlphaServer, many OpenVMS VAX customers have upgraded to the newer 64-bit AlphaServer system. This study focused on quantifying the benefits associated with upgrading various OpenVMS VAX systems to HP OpenVMS AlphaServer systems. A detailed cash flow analysis was performed on four different configurations to determine how quickly these systems paid for themselves.

TechWise Research surveyed a total of 62 companies in the United States that have upgraded a VAX environment to AlphaServer in the past three years(1). All respondents were required to be familiar with the upgrade process itself, as well as, the operational characteristics of the VAX environment and the AlphaServer environment that replaced it.

Study Results

One major finding is that companies who have upgraded their OpenVMS VAX to HP OpenVMS AlphaServer are extremely satisfied with their decision. Respondents reported many benefits as a result of their upgrade including increased performance, reduced service costs, greater growth capabilities, and increased customer satisfaction. Another key finding is that most companies saw a dramatic 61% decrease in downtime as a result of their upgrade. Based on the data collected, companies have the potential to save between $329,000 and $800,000 per year, in unplanned downtime costs alone, by upgrading an OpenVMS VAX system to an HP OpenVMS AlphaServer system.

Results of the study also show that the costs associated with upgrading software and installing the new system sometimes equals the price of the hardware itself. However, even despite this initial cost, the VAX to AlphaServer upgrade process pays for itself in a very short time. This is because the AlphaServer offers significant savings in service contract, management, and downtime costs. **When all these factors are considered in the analysis, the upgrade to HP OpenVMS AlphaServer pays for itself in six months or less for all four configurations tested**. Furthermore, companies have the potential to save millions of dollars over a three-year period.

(1) Note: This paper focuses exclusively on OpenVMS VAX to OpenVMS AlphaServer upgrades. All subsequent references to VAX and AlphaServer are specific to the OpenVMS operating system.

Background on VAX

Digital Equipment Corporation introduced the first VAX system in 1977. Since that time, many major technical advances were made to this 32-bit architecture product line. The 1983 introduction of the VMS cluster technology, combined with the 1985 introduction of the MicroVAX II platform, greatly expanded the system's popularity. More than one-half million VAX systems were sold during its 23-year life. However, like all computing architectures, the VAX could not remain on the leading edge of technology forever.

Digital introduced the first Alpha system in the Fall of 1992. At that time, the 64-bit Alpha architecture was promoted as the eventual successor to the 32-bit VAX architecture. As early as 1996, Digital started to publish end-of-ship plans for the VAX. Customers were given many years advance notice that the systems would eventually be discontinued. As a result, many VAX customers have transitioned or are transitioning their systems to new server environments. Many customers continue to use VAX systems. However, most VAX customers will eventually need to transition to a new system. Companies who have not yet done so may profit from knowing what is involved in the transition, and the benefits that result from switching to a new platform.

One resource to learn about the architectural differences between VAX and AlphaServer, is Terry Shannon's 1999 article: *"VAX to the Future, The Path Forward for the VAX Customer Base."*[(2)] In this article, Shannon not only provides a summary of the history of the VAX and AlphaServer platforms, but also compares them in terms of performance, scalability, support, compatibility and cost. This white paper strives to take Shannon's analysis one step further by not just comparing the platforms technologically, but also by quantifying customers' actual experience with the upgrade process.

Total Cost of Upgrade Defined

There are a number of costs involved when transitioning from a VAX to a new server environment. Many of these costs are the same ones considered in a total cost of ownership analysis. In previous TCO studies[(3)], TechWise Research analyzed the cost to acquire, install, manage, and service a system over its useful life. Recent studies have also included the cost of downtime in this calculation. All of these factors are also applicable in the upgrade decision. There is, however, one major difference between an upgrade and a traditional purchase. In an upgrade, it is more relevant to compare the new system with the system it is replacing, rather than to look at the new system in isolation.

Therefore, TechWise Research used a modified TCO approach to calculate the total cost associated with a VAX to AlphaServer upgrade. We call this analysis the Total Cost of Upgrade™, or TCU™ for short. TCU looks at the incremental, rather than the total costs associated with the upgrade. For instance, rather than just examining the management costs of the AlphaServer system, we quantified the difference between the management costs of the AlphaServer system with those of the VAX system it replaced. This way, we can estimate the annual savings customers would enjoy when they upgrade their system. This analysis also makes it possible to calculate a break-even point at which the new servers have paid for themselves through the savings they generate. This concept of TCU will be defined in more detail further on in this white paper.

(2) "*VAX to the Future, The Path Forward for the VAX Customer Base*," Shannon Knows Compaq, October 1, 1999.
(3) Total Cost of Ownership white papers, TechWise Research, various dates.

Screening Criteria

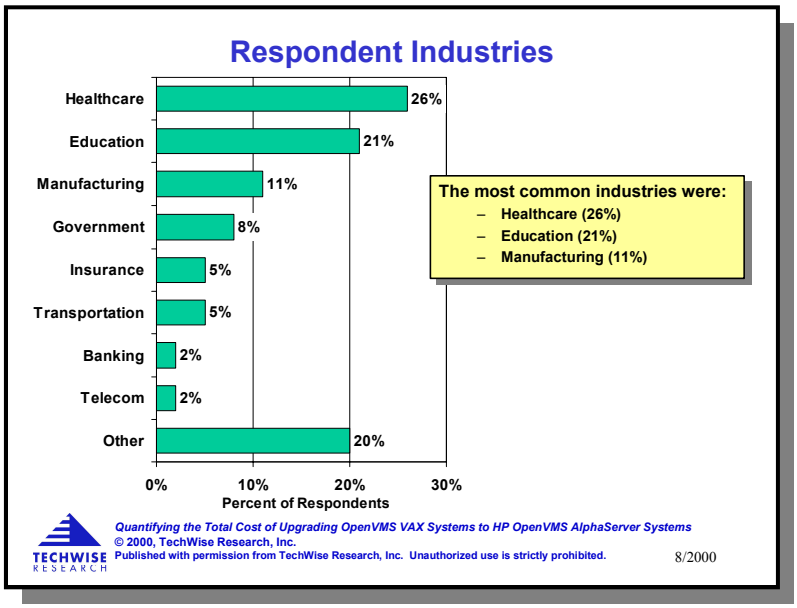
The best way to accurately measure the TCU from a VAX to AlphaServer would be to interview customers who have already completed the upgrade. That is what TechWise Research did for this study. A total of 62 US-based companies were interviewed in a two-phase process. All of these companies completed a VAX to AlphaServer upgrade. In Phase One, we pre-screened respondents by telephone. To qualify for the study, each respondent had to have upgraded a VAX system to AlphaServer in the past two to thirty-six months. The respondents also had to be personally familiar with the entire upgrade experience as well as the operational characteristics of the VAX environment and the AlphaServer system that replaced it. In Phase Two, respondents completed a thirty-minute web-based survey that collected all of the desired information. Prior to designing that survey, TechWise Research completed six, in-depth, hour-long interviews with customers who previously upgraded their VAX. The goal of these interviews was to identify all of the relevant issues to be measured in the web-based survey.

What Was Measured

TechWise Research collected the following information about each customer's upgrade:

- **Configuration** – The number and types of servers in the original VAX environment as well as the AlphaServer environment that replaced it.
- **Factor Importance –** The importance of several factors in the upgrade decision itself.
- **Satisfaction –** Customer satisfaction with the upgrade, both overall and with several key elements of the upgrade.
- **Start-Up Costs** – The cost to install and configure the AlphaServer environment as well as any time and money spent to train staff on it. This also includes any costs incurred in porting applications from the VAX to the AlphaServer platform.
- **Management Costs** – The difference in ongoing costs between the VAX and AlphaServer systems. This includes the costs associated with managing the environment (including back-up), system software, and all applications.
- **Downtime Costs** – The difference in unplanned downtime costs between the VAX and AlphaServer systems. The number of downtime hours experienced, and the cost per hour of downtime, was also collected.

The above information was combined with current system and service pricing in order to calculate a total cost of upgrade for each customer. Since each customer site has a unique VAX configuration, we selected four different configurations that represent the majority of upgrades and calculated the TCU for each of these four configurations.



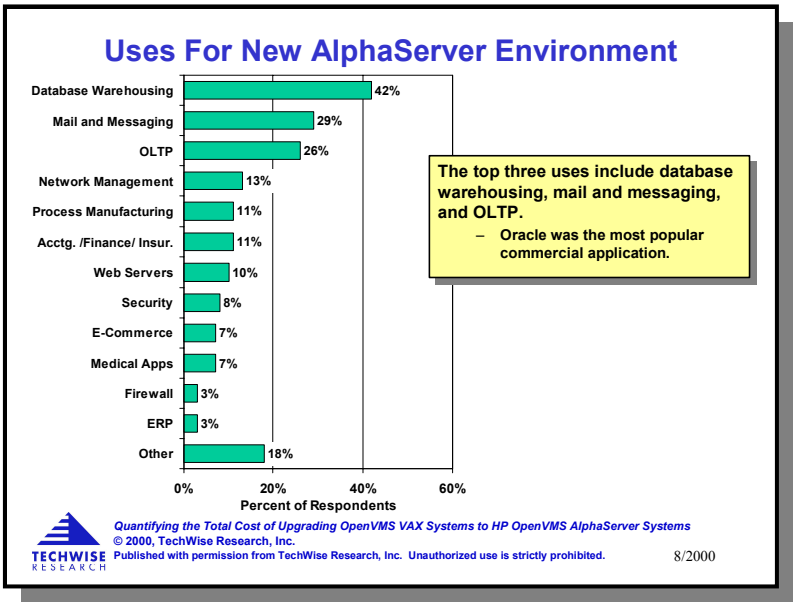
Who Was Surveyed

All participants were randomly recruited from a broad mix of industries. The chart on the left illustrates that the top industries represented include Healthcare, Education, and Manufacturing. Company size also varied widely among respondents. Not surprisingly, over one-third came from companies with 5,000 or more worldwide employees. However, nearly one in four respondents came from firms with fewer than 500 employees. This disparate range is a tribute to both the VAX's and AlphaServer's broad appeal to companies of all sizes.

The exact number and types of servers involved in the upgrade varied widely between respondents. On average, respondents generally upgraded two VAX servers to two AlphaServers. However, some upgraded a single VAX server, while others upgraded more than two. Additionally, some used this transition as an opportunity to consolidate several VAX systems to fewer AlphaServers, while others greatly expanded their computing capacity by moving fewer VAXs to more AlphaServers. All operational data were carefully scrutinized for statistical outliers to ensure that the type of upgrade path did not bias the study's findings.

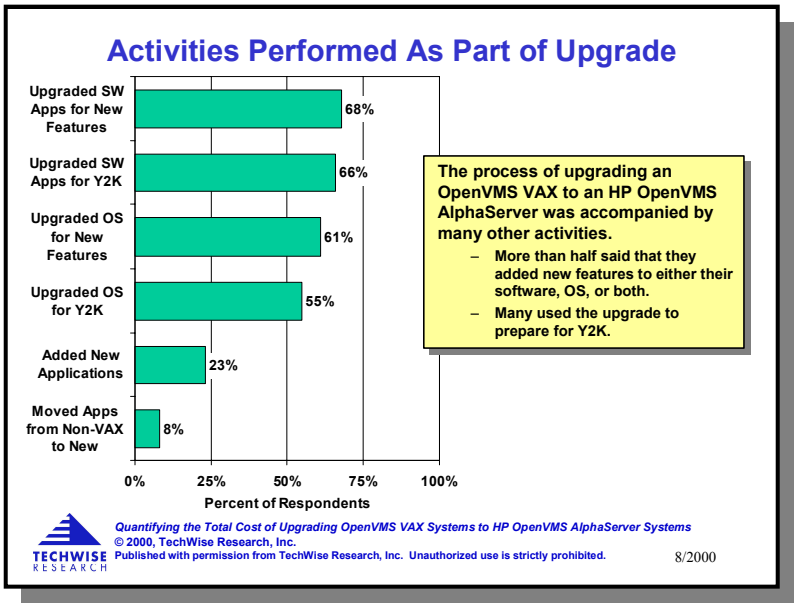
On average, respondents completed their upgrade 17 months ago. As previously stated, the upgrade had to be completed in the past two to thirty-six months in order to qualify. Forty-two percent completed theirs in the past year, while 31% did so in the past 12 to 24 months. Given this timeframe, respondents have had sufficient experience with their new HP AlphaServer system to be able to accurately compare its operational characteristics to the VAX environment it replaced.

The chart on the right illustrates how respondents are using their new HP AlphaServer environment. This study covers VAX upgrades in a wide variety of applications ranging from database to OLP, firewall, and ERP. The most common uses for the AlphaServer included database warehousing, mail and messaging, and OLTP. Oracle was the most popular commercial application on these systems.

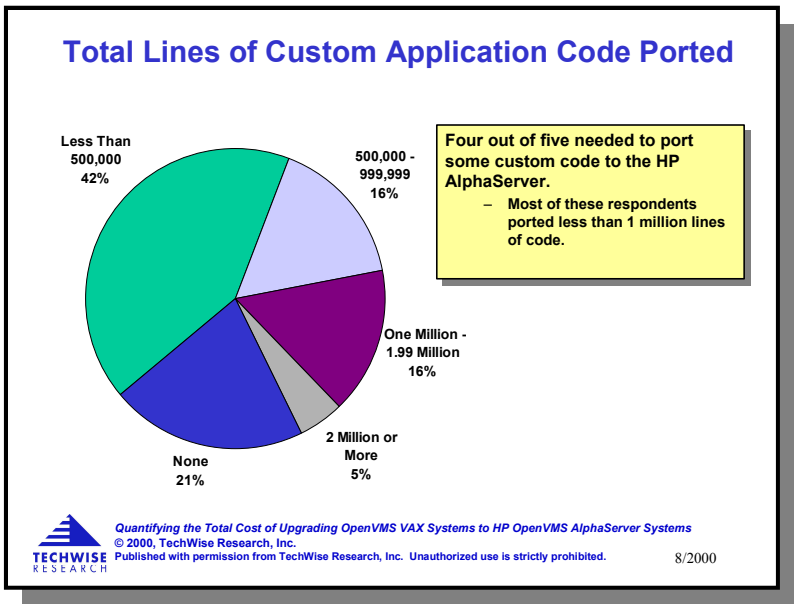


Steps Taken as Part of the Upgrade Process

As part of the study, TechWise Research identified all the various steps that went into the upgrade process. The chart on the right illustrates these findings. Overall, most respondents upgraded either their application software and/or their operating system when they upgraded their VAX servers to AlphaServers. Respondents were equally as likely to upgrade to gain new features, as they were to upgrade to prepare for Y2K. Almost one in three added applications to the HP AlphaServer that were not previously running on the VAX.



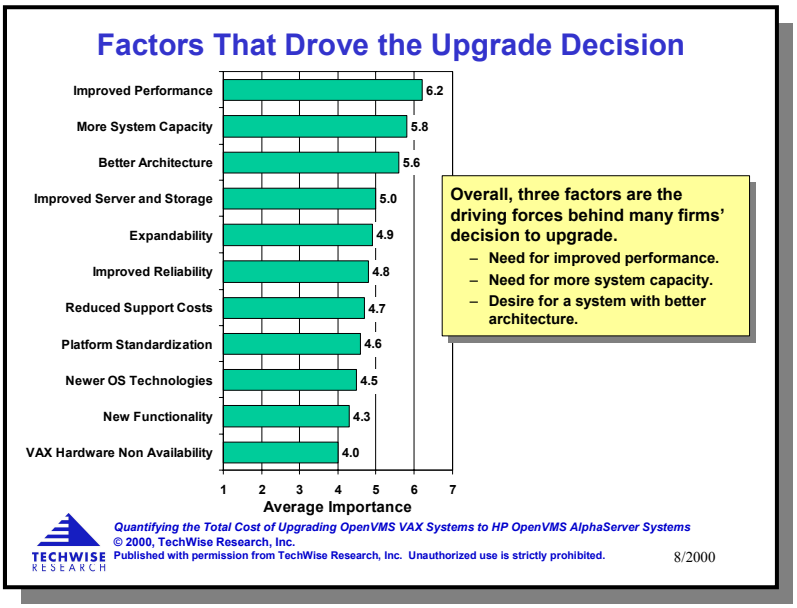
One of the benefits of upgrading from a VAX to an HP AlphaServer running OpenVMS is that the operating system stays the same. Customers who are running commercial applications on their VAX, such as Oracle, need only to contact their software vendor to purchase a license for OpenVMS AlphaServer. Those customers who are running custom code, however, need to port that code to OpenVMS AlphaServer. For some, a simple recompile on AlphaServer was all that was needed to port their software. For others, this process was more involved. As part of the TCU analysis, we asked each respondent to indicate how much application code, if any, they had to port to OpenVMS AlphaServer. Furthermore, all costs associated with this software porting were collected and included in the TCU analysis.

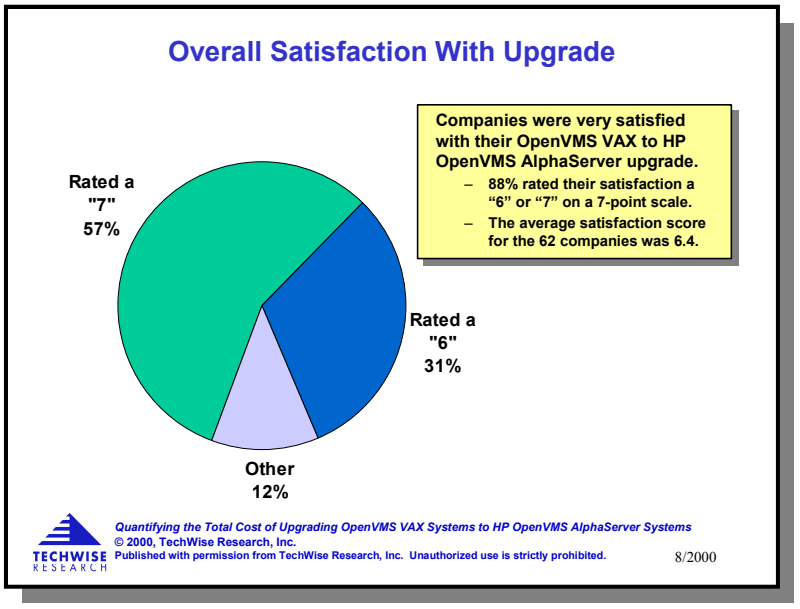


The chart to the left shows that 79% of the respondents ported some custom code as part of their AlphaServer upgrade. Most firms ported less than one million lines of code. The qualitative interviews conducted at the start of this study revealed that in most cases, this porting process was relatively easy. To make this porting process easy, "…OpenVMS engineers spent more than 200 person-years porting the OpenVMS operating system to the Alpha architecture," per Terry Shannon. Based on this study, it appears these efforts were successful.

We also asked respondents to rate the importance of eighteen different factors in their company's decision to upgrade their OpenVMS VAX system to OpenVMS AlphaServer. Each factor was rated on a seven-point scale, where a seven rating meant that is was one of the most important factors in

the upgrade decision. The chart on the right summarizes the findings for the eleven most important factors. Overall, three primary factors, the need for improved performance, greater system capacity, and better architecture drove the upgrade decision for many respondents. Between 66% and 45% of respondents rated these three factors among the most important. Between 19% and 29% of respondents rated the need for improved server and storage utilization, system expandability, reliability, and reduced support costs as most important.





Satisfaction with the Upgrade

Respondents rated their overall satisfaction with their upgrade on a seven-point scale. The chart on the left illustrates the findings. Overall, most respondents were very satisfied with their upgrade. The average satisfaction score for all respondents was a 6.4 out of seven. Fifty-seven percent of the respondents rated their upgrade a perfect seven out of seven.

Numbers, however, only tell part of the story when it comes to satisfaction studies. Respondents were also asked to provide comments regarding their VAX upgrade, both overall and with certain key aspects of the move. The following are verbatim comments provided by five different respondents:

"We have been very pleased with the overall performance of our AlphaServer 4100. It has become the most reliable piece of hardware that we run."
– Charles Siceloff, Miami International Forwarders

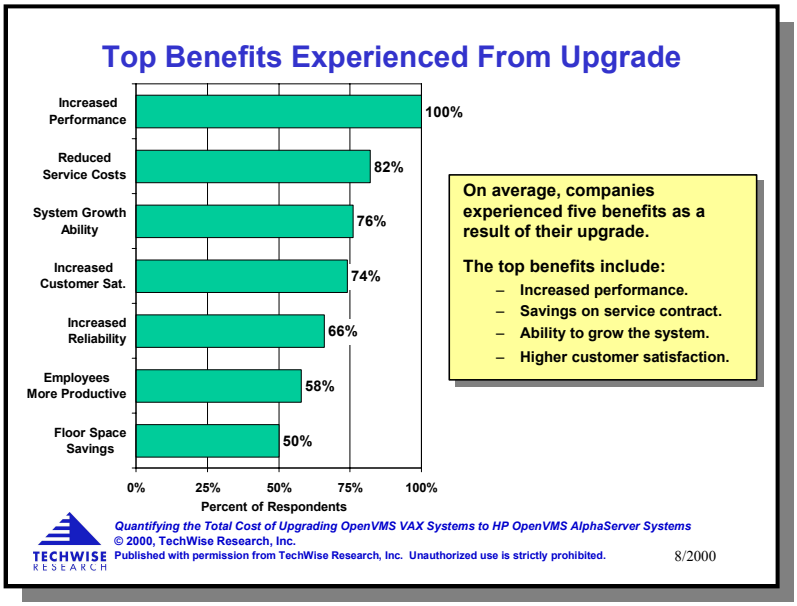
"We have found the AlphaServer to be more than advertised. We feel it is the most powerful RISC Server available on the market. Our customers and management staff have all commented on the great response time they have on the AlphaServer." – Rick Hungerford, Verizon

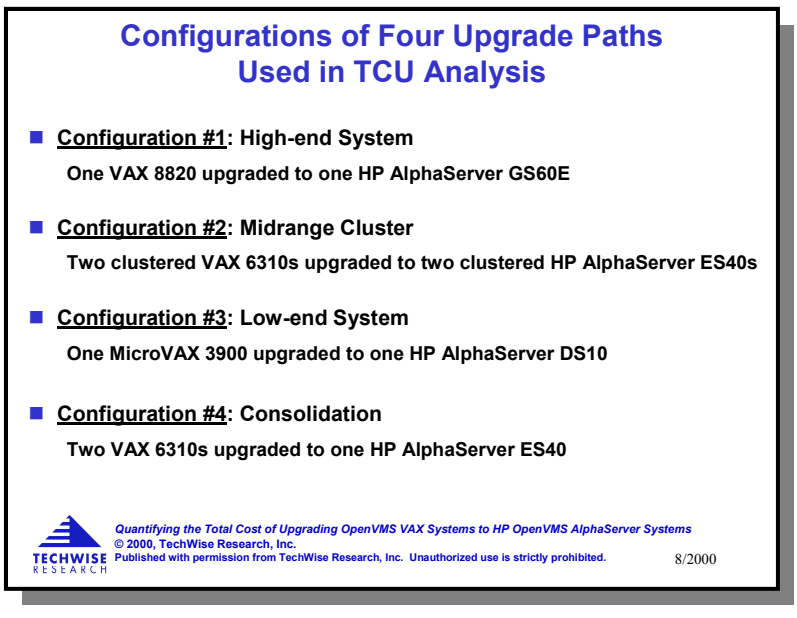
"The 64bit Alpha is a very reliable and fast machine. The OpenVMS is a proven operating system, with a lot of functionality built-in that other systems only offer as add-ons."
– John Robinson, Northern Trust Bank

"I was pleased with the new Alpha OpenVMS environment since we upgraded from the VAX machine. The AlphaServer has been running without any problems. It is easier to maintain and monitor." – Phan Vu, Dynamic Graphics, Inc.

"We are extremely satisfied with our decision to upgrade to the AlphaServer. The users are experiencing better response and performance. Upper management feels they have received a great ROI. And, the upgrade was simplified due to keeping the same OpenVMS operating system across platforms." – Chris Krall, University of Scranton

The chart on the right illustrates the top benefits companies reported as a result of their upgrade. Not surprisingly, everyone reported improved performance. Overall, most companies experienced five different benefits as a result of their upgrade. In addition to performance gains, upgrading a VAX to an HP AlphaServer led to lower service costs, greater growth capabilities, and higher customer satisfaction. Detailed analysis of the TCU data respondents provided uncovered additional benefits, such as lower management and downtime costs.





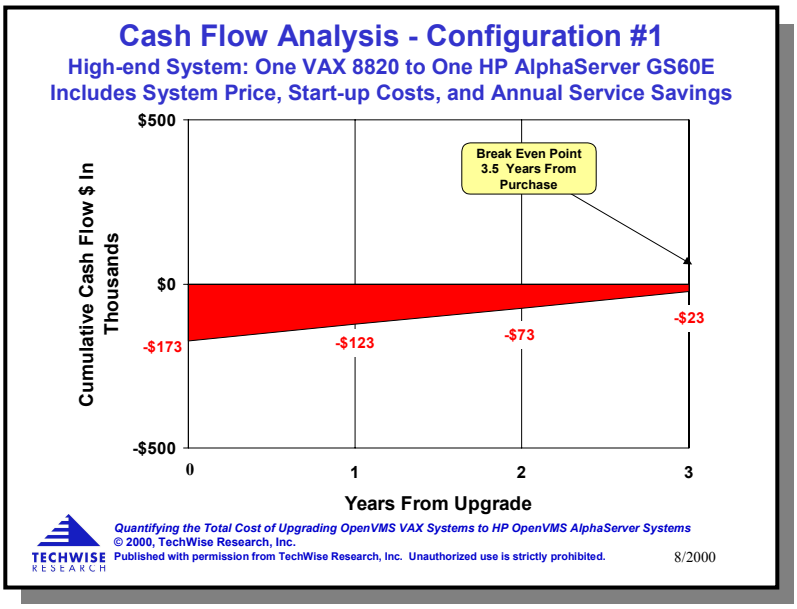
Configurations Tested

To better understand the TCU VAX customers experienced, a cash flow analysis was performed for four different upgrade paths. The chart to the left identifies each of these four upgrade paths, along with the number and type of servers in both the original VAX and new AlphaServer environments. The first three paths involve upgrading the same number of VAX servers to the same number of HP AlphaServers. The fourth configuration is an example of server consolidation, as some respondents consolidated multiple VAX systems onto fewer HP AlphaServers. The next few pages of this white paper will present the cash flow analyses (i.e., break-even point) for each of these four upgrade paths.

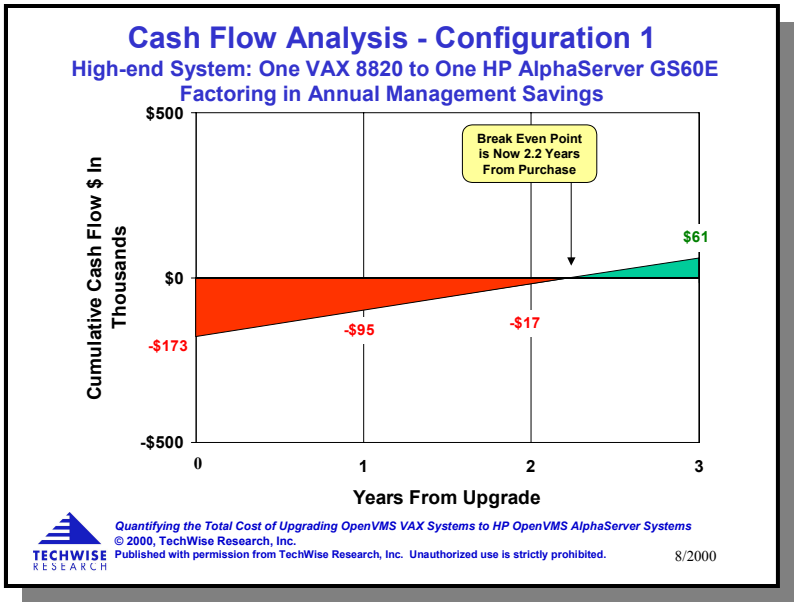
Impact of Various Costs on the Break Even Analysis

As explained earlier, TCU involves many components such as system pricing, start up costs, annual service agreements, management costs and downtime costs. To illustrate the impact each of these factors has on the break-even point, the cash flow analysis for Configuration #1 is shown in three successive phases or charts. In this Configuration, a single VAX 8820 is upgraded to a single HP AlphaServer GS60E. As of June of 2000, the list price for the AlphaServer GS60E was $95,000. In addition to the price of the hardware itself, there are additional costs associated with start-up such as installation, training, and software porting and upgrades. In this study, companies spent an average of $33,000 to install their new server and train their staff how to use it. Respondents also spent an average of $45,000 porting all of their system and application software from VAX to Alpha. When all of these costs are added together, the total start-up cost for this configuration is $173,000.

Companies who upgrade from a VAX to AlphaServer have the potential to save money on their service contract. This is the first of three saving factors used in the TCU analysis. To purchase 24 x 7, 4-hour response service on a VAX 8820 currently costs $67,000 per year. This fee is only $17,000 for an HP AlphaServer GS60E that is still under warranty.



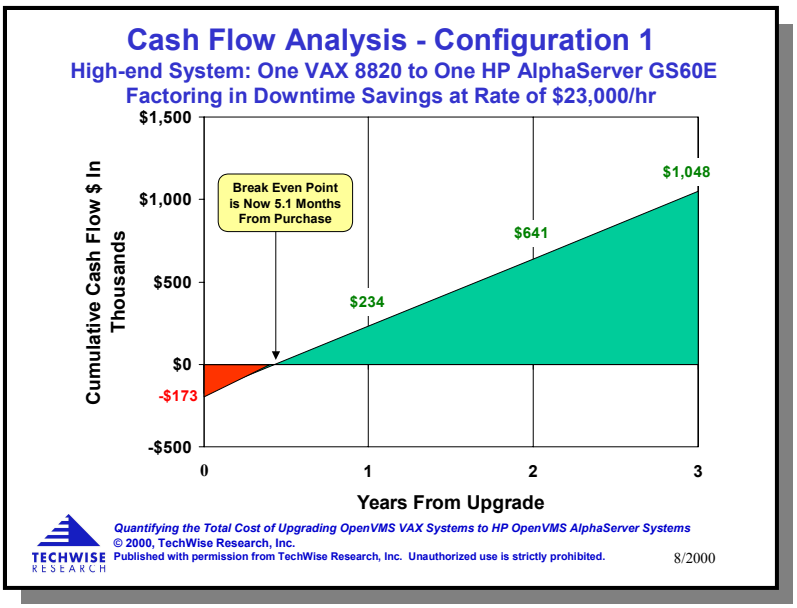
The graph on the right illustrates the cumulative cash flow for this upgrade path factoring in the service cost savings. The total initial outlay for this upgrade is $173,000. However, this upgrade will result in annual service cost savings of $50,000. The break-even point, therefore, is 3.5 years. The service contract cost savings would pay for the system after 3.5 years.



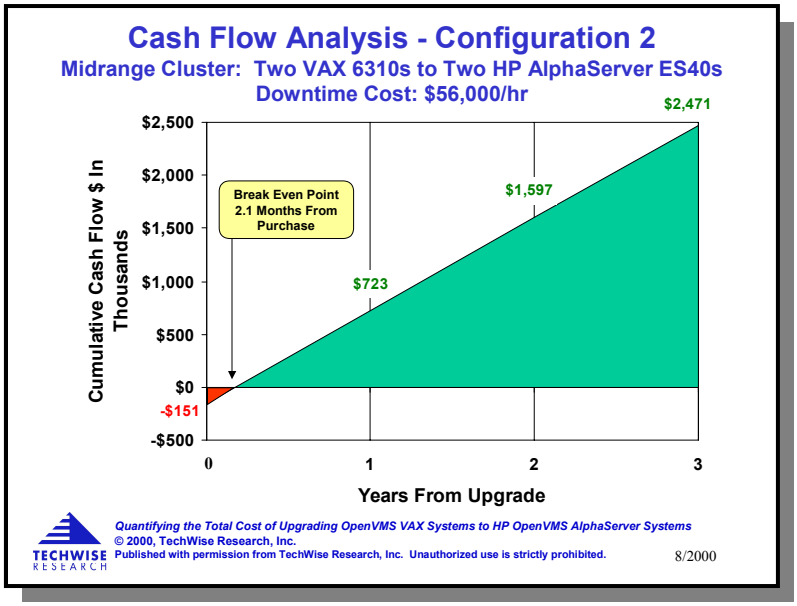
Service costs, however, are not the only source of savings. As part of this study, respondents provided the number of hours spent managing and maintaining their original VAX and new AlphaServer environments. The results show that companies spend far fewer hours managing their HP AlphaServer systems than their VAX systems. This difference translates into an extra $28,000 of savings per year. The chart on the left illustrates the cash flow for this same upgrade when both service and management savings are taken into account. The break-even point has improved from 3.5 years to 2.2 years.

Downtime costs reflect the final component in our cash flow analysis. Each respondent reported the total number of hours their VAX environment was down during the last twelve months of its operation. They also reported the same findings for their new AlphaServer environment. The latter data were annualized to one year for those firms that upgraded in the past 12 months. The results show that companies experienced a dramatic decrease in downtime after their upgrade. Companies that upgraded a VAX to an AlphaServer saw their downtime decrease, on average, from 23.3 to 9.0 hours per year. Several factors are likely contributing to this finding. First, many respondents indicated that their computing needs had outgrown their VAX environment. Any system, no matter how reliable, will experience more failures when it is run at a very high utilization rate. Second, other studies(4) have quantified the HP OpenVMS AlphaServer platform's high reliability.

Each company places its own unique value on downtime. These costs can range from a few thousand to over one million dollars per hour. The average rate among the respondents in this study with standalone systems was $23,000 per hour. Applying this downtime rate yields the chart to the right. This chart shows the upgrade cash flow analysis when all start-up costs and savings factors are considered. When downtime savings are factored in, the upgrade would pay for itself in only five months.



Break Even Analysis for Other Configurations

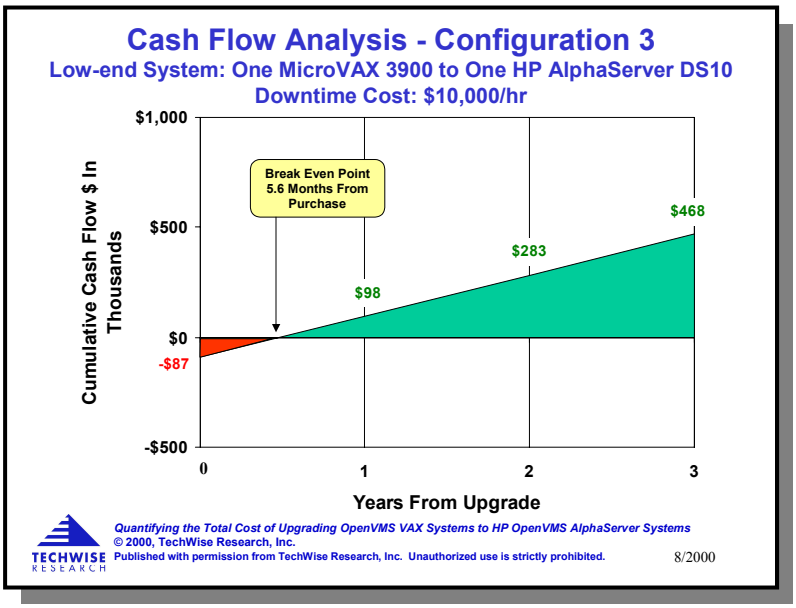


In Configuration #2, a midrange cluster of two VAX 6310 servers are upgraded to two HP AlphaServer ES40 servers. The total start-up cost for this configuration is $151,000. This is less than the total start-up costs for Configuration #1 because the system price of two ES40 servers is less than that for the GS60E. The average cost associated with downtime among respondents in this study with clusters was $56,000 per hour. Applying this rate yields the chart to the left. When downtime savings are factored in, this upgrade would pay for itself in only two months!

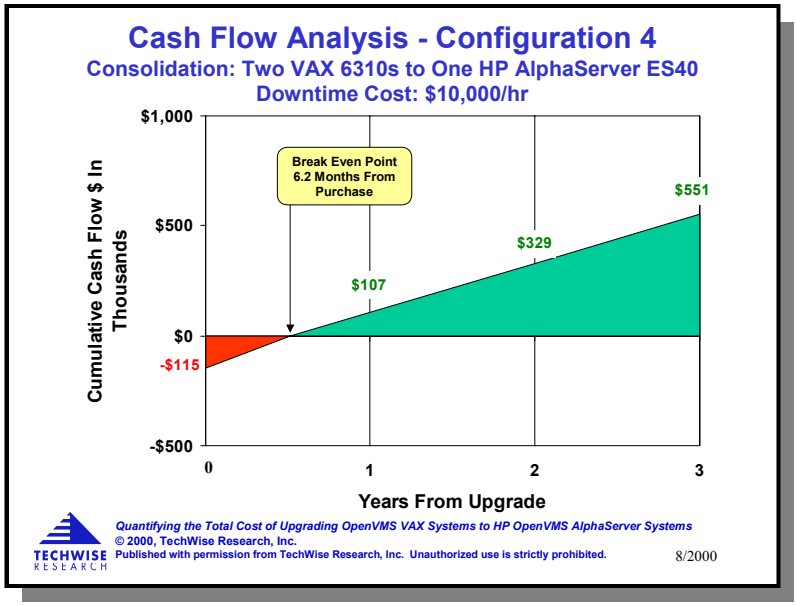
(4) *"Quantifying the Value of Availability,"* TechWise Research, Inc., June 2000.

This surprising finding is driven by the high reliability of the HP OpenVMS AlphaServer system. As previously reported, companies that have upgraded their VAX system to AlphaServers experienced, on average, 14.3 fewer downtime hours. Using the average rate of $56,000 per hour, this translates into annual downtime savings of $800,000. The downtime savings alone would pay for the new servers in a few short months. After three years, this upgrade would generate cumulative savings of almost $2.5 million.

The chart on the right illustrates the cash flow analysis for Configuration #3. This configuration contains low-end standalone systems. For this reason, a relatively low downtime cost rate of $10,000 was used in the analysis. However, even using this conservative rate, the analysis shows this upgrade would pay for itself in less than six months.



The final configuration studied involves an example of server consolidation. For this upgrade path, the number of servers managed under one contract is reduced. This is an additional savings on top of other management and downtime savings from non-consolidation upgrades. Many companies that undergo server consolidations have higher downtime costs since they are relying on one system to run more applications. For this particular analysis, we chose a very conservative rate of $10,000 per hour in order to downplay the role of downtime costs in the analysis. Despite this conservative rate, this upgrade configuration would pay for itself in six short months. Cumulative savings over a three-year period would exceed $500,000. In consolidation cases where a higher downtime rate was applicable, these savings would increase dramatically.



Non-Financial Benefits

In the preceding cash flow analyses, we considered savings that result from lower service, management and downtime costs. In addition to these savings, respondents reported a number of other benefits associated with their upgrade. These additional benefits include increased customer satisfaction, improved employee productivity, and ability to grow their computer operations. Although difficult to quantify in terms of dollars, these benefits are extremely important and should be factored into the upgrade decision.

Conclusion

This study focused on quantifying the benefits associated with upgrading various OpenVMS VAX systems to HP OpenVMS AlphaServers. A detailed cash flow analysis was performed on four different configurations to determine how quickly these systems paid for themselves. A variety of factors were included in this TCU analysis: the list price of the new AlphaServer systems, current service pricing for the AlphaServer and VAX systems, all of the start-up costs associated with installing the new AlphaServer system, and the management and downtime cost savings.

One major finding is that companies who have upgraded their OpenVMS VAX to HP OpenVMS AlphaServer are extremely satisfied with their decision. Fifty-seven percent rated their satisfaction a perfect seven out of seven. Respondents reported many benefits as a result of their upgrade including increased performance, reduced service costs, greater growth capabilities, and increased customer satisfaction.

Another key finding is that most companies experienced a dramatic decrease in downtime as a result of their upgrade. Average annual downtime hours dropped from 23.3 with their OpenVMS VAX to only 9.0 with their HP OpenVMS AlphaServer environment. This is a tremendous benefit for any firm that has concerns about maximizing availability. Companies in this study reported that their average cost per hour of downtime was $23,000 for standalone systems and $56,000 for clustered systems. Using these figures, companies have the potential to save between $329,000 and $800,000 per year in downtime costs alone from a VAX to HP AlphaServer upgrade.

Results of the study also show that the costs associated with upgrading software and installing the new system sometimes equals the price of the hardware itself. However, even despite this initial cost, the VAX to AlphaServer upgrade process pays for itself in a very short time. This is because the HP AlphaServer offers significant savings in service contract, management, and downtime costs. **When all these factors are considered in the analysis, the upgrade to HP OpenVMS AlphaServer pays for itself in six months or less for all four configurations tested. Furthermore, companies have the potential to save millions of dollars over a three-year period.**

Many current VAX customers will eventually face the decision to replace their VAX. For some, this decision is years away. For many others, this decision is more imminent due to their company's need for increased performance and capacity. Either way, VAX customers have the choice to stay with OpenVMS or migrate to another platform, such as UNIX. Many respondents in this study commented on the relative ease of upgrading to AlphaServer due to the stability of the OpenVMS operating system across both platforms. Other studies have shown that OpenVMS AlphaServer platforms often have the lower management and downtime costs than comparable UNIX platforms. Given all of this, VAX customers would be wise to seriously consider implementing an HP OpenVMS AlphaServer upgrade. One respondent summarized these findings best:

> *"We are extremely satisfied with our decision to upgrade to the AlphaServer. The users are experiencing better response and performance. Upper management feels they have received a great ROI. And, the upgrade was simplified due to keeping the same OpenVMS operating system across platforms."* – Chris Krall, University of Scranton

TechWise Research is an independent primary market research firm that specializes in the computer industry. If you have any questions regarding this research, please contact us at:

VAXupgrade2000 @TechWise-Research.com .