DELL EMC

THE ROI OF PRIVATE CLOUD

Quantifying the cost savings and benefits of moving to a private cloud

ABSTRACT

Challenged to decrease costs, increase efficiency and compete with external service offerings, IT needs to find a way to shift resources towards business innovation and agile service delivery. Moving to a private cloud environment can provide the scalability, accessibility and elasticity to help IT meet these needs. However, this type of transformation can require material investments. Projecting the ROI of the transformation provides the cost savings and benefits to justify these investments.

This white paper provides an overview of key measurements used in determining the ROI of cloud transformation. It addresses business-as-usual (BAU) costs, target state costs, and costs to implement the transformation. Additional metrics including Net Savings and Payback Period are discussed. The average cost savings seen across a spectrum of organizations implementing cloud transformation, as well as detailed ROI analyses for three organizations looking to move to private cloud are provided.

January 2017

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EXECUTIVE SUMMARY

IT organizations are often perceived as too slow and too expensive. They are traditionally focused on maintaining operations ("keeping the lights on") and are challenged to provide the agility and responsiveness that the business needs. As a result, IT needs to find a better way to balance ongoing operations management with innovation and agility.

Moving to a private cloud environment can provide the scalability, accessibility and elasticity that IT needs. Standardizing, consolidating and virtualizing hardware and software infrastructure reduces costs and improves operational efficiencies. Migrating applications to appropriate cloud platforms improves availability and scalability. Evolving IT organizational structures, roles and processes to a services-oriented model helps IT better align with the business, improve operational efficiency, and increase agility to deliver the services the business needs faster.

While there are clear savings and benefits of moving to the cloud, this type of transformation can be costly. Projecting the ROI can provide the benefits, costs, and risks of the transformation to understand the economic impact and justify the investment.

This white paper provides an overview of key measurements used in determining the ROI for cloud transformation, including business-as-usual (BAU) costs, target state costs, and transition costs. Additional metrics including Net Savings and Payback Period are discussed.

The typical savings seen from cloud transformation are examined. The detailed ROI analyses for three organizations looking to move to private cloud, each with varying transformation scope and objectives, are provided. The first organization is a regional healthcare provider looking to improve developer productivity. The second organization is a global insurance organization focused on driving down IT operational costs. The third is a premier energy company that wanted to reduce their data center footprint as well as the cost of outsourced operations management. A summary of the results of the analyses are shown in Table 1.

Table 1: Summary of Cloud Transformation ROI Analyses

SCENARIO	KEY TRANSFORMATION OUTCOMES	ROI	PAYBACK PERIOD
REGIONAL HEALTHCARE PROVIDER • Goal: Improve developer productivity • Scope: 2 data centers, 2000 servers, 150 applications • Current state: 40% virtualized, no service catalog, no automation	• 33% cost savings • Improved agility and efficiency through automation • Increased scalability and utilization with 100% virtualization • Time to provision developer services reduced from 8 weeks to 1 day • 50% of IT staff time reallocated to new initiatives	96%	2.7 years
GLOBAL INSURANCE ORGANIZATION • Goal: Reduce operational costs • Scope: 2 data centers, 5000 servers, 500 applications • Current state: 80% virtualized with 40% utilization, no service catalog, no automation	• 17% cost savings • Improved agility and efficiency through automation • Increased scalability with 95% virtualization • Time to provision production services reduced from 8 weeks to less than 1 week • 33% of IT staff time reallocated to new initiatives	101%	3.3 years
PREMIER ENERGY COMPANY • Goal: Reduce data center footprint & cost of outsourced operations management • Scope: 15 data centers, 1900 servers, 400 applications • Current state: 60% virtualized, no service catalog, limited automation	• 38% cost savings • Data centers for in-scope applications consolidated from 15 to 7 • Improved agility and efficiency through automation • Increased scalability with 100% virtualization • Operations management contract cost reduced 25%	123%	2.4 years

Note: In order to protect customer privacy, each case study contains modifications from the actual customer scenario that do not impact the analysis. The relative difference between cost savings and ROI is reflective of the level of investment required.

MEASUREMENTS FOR DETERMINING ROI

Calculating the ROI for cloud transformation is more than just a comparison of current hardware and software costs against target hardware and software costs. There are many other factors that need to be considered, such as migration and transition costs, training costs, and opportunity cost.

BUSINESS-AS-USUAL (BAU) COSTS

The first step in determining ROI is ascertaining the BAU costs, or the CAPEX and OPEX for the various components of the current IT environment. This includes the depreciation and maintenance costs of the hardware (e.g., servers, storage) used in delivering services. It also includes the licensing, depreciation and maintenance costs of the software used to deliver services. Some examples are server operating systems, utilities (e.g., monitoring, messaging, backup and restore), subsystems (e.g., java virtual machines, database management systems), and applications (e.g., server management, service management). The local and wide area network costs as well as costs for the embedded network components of services (e.g., server network interface cards, SAN fabric) need to be considered as well.

Additional BAU costs include the fully loaded cost of in-house staff that delivers services (e.g., IT operations staff, development staff); the costs for power, cooling, space, physical security, remote hands, and administration (people, tools and vendors) of the physical sites that host services; fees paid to outside organizations that assist in supporting services, such as outsourced Help Desk support; and charges levied against the general ledger account to cover corporate expenses, taxes, etc.

TARGET STATE COSTS

Similar to BAU costs, target state costs are the CAPEX and OPEX for components of the target IT environment, including hardware, software, infrastructure, networking, facilities, staff, fees for external services, and overhead. Estimating target state costs requires a good understanding of what the target state will be. Implementing a private cloud? Moving to a hybrid cloud? Consolidating data centers? The end state is required to determine what types of data are needed.

TRANSITION COSTS

In addition to current and target state costs, the costs to get to the target state are required. Typical transition costs include the additional swing hardware and parallel systems needed to perform transformation activities. For example, when migrating applications from platform A to platform B additional storage space may be needed to execute the extracts and summaries. The temporary hardware is released after the transformation activities are done. And when moving off current systems and onto the new systems, both current and target systems will need to be running in parallel until the cutover is complete.

Transition costs also include costs for additional licenses and parallel licenses. For example, the current environment may use SAP ASE (Sybase), and the target environment may use Oracle. New licenses will need to be purchased for the target database and both the current and target databases will need to be running in parallel until the transformation is complete.

Additional costs are the supplemental connectivity needed to effect the change; staff time needed to support the transformation, as well as the organization that needs to be assembled and trained; facilities needed to effect the change; and fees paid for consulting services and supplemental support, including transitional consulting and support needed to train in-house staff.

A cost that should not be overlooked is opportunity cost. This includes the cost of projects that cannot be performed because of the resources/staffing focused on the transformation, financial investments that cannot be made because of the transformation, and the cost of funds.

NET SAVINGS AND PAYBACK PERIOD

In addition to ROI, there are other metrics that should be evaluated when assessing the business impact of cloud transformation. Two critical metrics are Net Savings and Payback Period.

Net Savings analysis starts with a cost-benefit analysis (CBA) to determine the total cost of ownership (TCO), capabilities and risks for the current state and for the target state. This analysis should address costs at an atomic level, for example, cost per user, cost per VM, cost per vCPU, etc. The TCO is used to calculate IT budget run rates for the current state and the for the target state.

An investment profile based on the transformation roadmap provides the capital and services investments required for the transformation. These costs, along with the target run rate costs, provide the net IT costs for the transformation. Comparing this to the current state run rate yields the Net Savings. The analysis should also take into account the time value of money by calculating the net present value (NPV) of the investments and savings. This will show the potential investment returns in current dollars. All of the analysis should be multi-year, typically covering a five year investment period.

Payback or breakeven analysis evaluates how much time, usually expressed in years, it takes to recover the total cost of the investment (including both capital and services costs) and therefore, when the real savings from the transformation takes effect.

There are numerous other measurements that can be projected to demonstrate the business value of cloud transformations. Examples of some of these measurements are shown in Appendix A.

TYPICAL SAVINGS FROM CLOUD TRANSFORMATION

IDG Research Services surveyed global business and technology leaders to better understand the typical savings realized from implementing hybrid cloud. IDG found, on average, IT costs were reduced by 24%.[1] In addition, Forrester Consulting conducted a Total Economic Impact (TEI) study to examine the potential ROI of investing in an on-premises private cloud. They determined that for a composite organization based on existing private cloud adopters the ROI is 111%, with a Payback Period of 13.2 months.[2]

These findings align with numerous ROI analyses performed by Dell EMC Services. The analyses span dozens of organizations across multiple industries including financial services, insurance, telecommunications, pharmaceutical, healthcare and energy. The types of cloud transformations evaluated included moving to private cloud, adopting public cloud, and moving to hybrid cloud. The IT organizations were of varying sizes with different levels of capability and maturity. The analyses show an average IT cost savings of 18-26 percent. While these results are typical, “your mileage may vary.” Our analyses have shown savings as high as 45 percent.

CASE STUDY 1: IMPROVING DEVELOPER PRODUCTIVITY

This regional healthcare provider was looking to better support the application developers aligned to the business units. There were specific challenges that impacted their IT organization’s ability to provide the services that the development teams needed. They had no service catalog; they only had internal rate cards. There was no automation, and no self-service capability. It typically took weeks, and even months, to provision services to the end users. As a result, the application development teams were using external vendors to get the infrastructure services needed to support development activities. IT needed way to provide their developers with an automated, self-service environment with rapid provisioning of infrastructure services meet development needs and timelines, and to discourage Shadow IT.

To address this, the IT organization was looking to implement a private cloud with Enterprise Hybrid Cloud deployed on mirrored VCE Vblock systems as the foundation for their development environment. Key characteristics of the platform included:

- Self-service and automated provisioning to increase the speed in which IT is able to deliver services
- Multi-tenancy to support multiple heterogeneous environments
- Resource elasticity to optimize resource utilization delaying the purchases of additional capacity
- Metering and chargeback to inform the business of their utilization
- Automated monitoring to improve availability as well as reduce the IT staff FTE effort
- Backup and recovery for data protection
- Replication and recovery for disaster recovery

CURRENT AND TARGET ENVIRONMENTS

This organization had two parallel sites that they wanted to maintain for their key application development and maintenance workloads. This included 150 existing applications across 2,000 servers that were needed to support development and maintenance activities. These 2000 servers would be replaced by two VCE Vblock systems. All 150 applications would be migrated to the new environment.

An initial Infrastructure as a Service (IaaS) service catalog of Linux and Windows servers would be deployed. The transformation included adapting existing service operation, changed control and security processes for the new environment, as well as creating a new service portfolio management process, and aligning IT and application development staff to these processes.

The components of the current and target sites, specific to the proposed cloud transformation, are shown in Table 2.

Table 2: Case Study 1 Current and Target Environments

COMPONENT	CURRENT ENVIRONMENT	TARGET ENVIRONMENT
Sites	2	2
Servers	2000 servers	2 VCE Vblock 740s
Storage	2 Petabytes on Dell EMC VMAX	
Networking	Cisco networking	
Virtualization	Servers 40% virtualized with VMware	Servers 100% virtualized with VMware
Automation	No automation, manual processes only	VMware vRealize Automation
Management/ Monitoring Tools	IBM Netcool	VMware vRealize Operations VMware vRealize Business
IT Staff FTEs	20	10
Backup/Recovery	Veritas NetBackup	Dell EMC Avamar Dell EMC Data Domain
Replication	Veritas NetBackup	Dell EMC RecoverPoint

ROI ANALYSIS

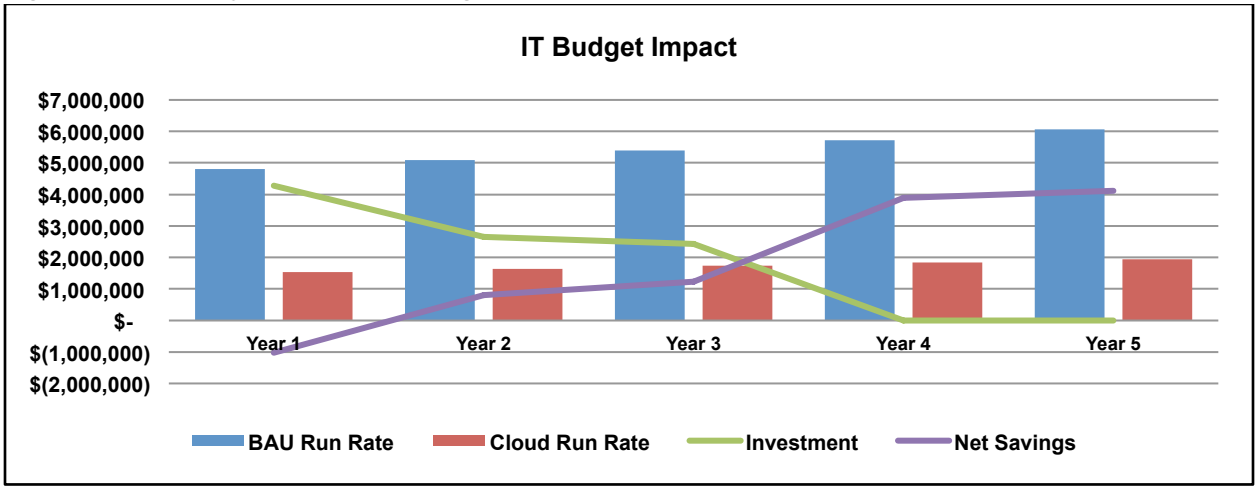
This organization was pursuing a comprehensive transformation that included people, processes and technology. The analysis was based on the projected savings through improving processes, aligning the organization, as well as the cost benefit analysis of hardware and software consolidation. Table 3 shows the five-year metrics used to determine the ROI.

Table 3: Case Study 1 Five-Year Transformation Metrics

Metric	Year 1	Year 2	Year 3	Year 4	Year 5	5 Year Total
BAU Run Rate	$4,800,000	$5,088,000	$5,393,280	$5,716,877	$6,059,889	$27,058,046
Cloud Run Rate	$1,540,000	$1,632,400	$1,730,344	$1,834,165	$1,944,215	$8,681,123
Run Rate Savings	$3,260,000	$3,455,600	$3,662,936	$3,882,712	$4,115,675	$18,376,923
Capital Investment	$1,248,000	$1,221,120	$1,078,656	$0	$0	$3,547,776
Services Investment	$3,040,000	$1,423,000	$1,350,000	$0	$0	$5,813,000
Total Investment	$4,288,000	$2,644,120	$2,428,656	$0	$0	$9,360,776
Net Savings	$(1,028,000)	$811,480	$1,234,280	$3,882,712	$4,115,675	$9,016,147

The projected Net Savings is $9.0M (33 percent cost savings over BAU costs) with an NPV of $7.6M. Investment costs, including both capital and services investments required for the transformation, are $9.4M with an NPV of $8.7M. The ROI is 96 percent, driven by the moderate total investment relative to the run rate savings. The Payback Period is 2.7 years. Figure 1 shows a graphical representation of the five-year impact on the IT budget.

Figure 1: Case Study 1 Five-Year IT Budget Impact



Key benefits of the transformation include improved agility and efficiency through automated processes, increased scalability and utilization through server virtualization, reduced provisioning time from eight weeks to one day through self-service and automated provisioning, and 50 percent of IT staff time reallocated to new initiatives.

CASE STUDY 2: DRIVING DOWN OPERATIONAL COSTS

The main transformation objective of this global insurance organization was to reduce overall costs of their production environment. They wanted to modernize and automate as much of their IT environment as they could, and to improve operational efficiencies. They already had a high degree of virtualization and standardized service offerings. However, they had no online service catalog, and no self service capability. It typically took six to eight weeks to provision a service. Key service management processes were not in place.

IT realized they needed to improve their overall service management competence. They wanted self service capabilities and automated provisioning to drive provisioning time down to one week. They were also looking for greater elasticity, shared workloads with pooled capacity, and metered consumption of services.

To address this, the IT organization was looking to implement a private cloud with Enterprise Hybrid Cloud deployed on multiple mirrored Vblock systems for two sites. Key characteristics of the platform included:

- Self-service and automated provisioning to increase the speed of delivering IT services at lower cost
- Multi-tenancy to support heterogeneous environments
- Resource elasticity to optimize the utilization of IT resources
- Metering and chargeback to inform the business of their service utilization
- Automated monitoring to proactively manage services and increase availability
- Backup and recovery for Data Protection
- Replication and recovery for Disaster Recovery

CURRENT AND TARGET ENVIRONMENTS

This organization had over a 100 sites total; however, production ran in two main data centers. Virtualization was clustered with varying degrees of utilization and density. The target environment consisted of consolidated clusters in the two main data centers using VCE Vblock systems running VMware vRealize automation software.

For this implementation, 500 existing applications would be migrated to the new environment. An initial IaaS service catalog of Windows and Linux servers would be deployed. The transformation would include creating 15 new service management processes spanning the entire service management lifecycle, as well as realigning the IT organization, roles and skills to manage the new processes.

The components of the current and target sites, specific to the proposed cloud transformation, are shown in Table 4.

Table 4: Case Study 2 Current and Target Environments

COMPONENT	CURRENT ENVIRONMENT	TARGET ENVIRONMENT
Sites	2	2
Servers	5000 servers	4 VCE Vblock 740s
Storage	13 Petabytes on Dell EMC VMAX and Dell EMC VNX	
Networking	Cisco networking, physical only	
Virtualization	Servers 80% virtualized with VMware (40% max utilization, 5:1 density)	Servers 95% virtualized with VMware
Automation	No automation, manual processes only	VMware vRealize Automation
Management/ Monitoring Tools	IBM Tivoli Monitoring	VMware vRealize Operations VMware vRealize Business
IT Staff FTEs	60	40
Backup/Recovery	Veritas NetBackup	Dell EMC Avamar Dell EMC Data Domain
Replication	Veritas NetBackup	Dell EMC RecoverPoint

ROI ANALYSIS

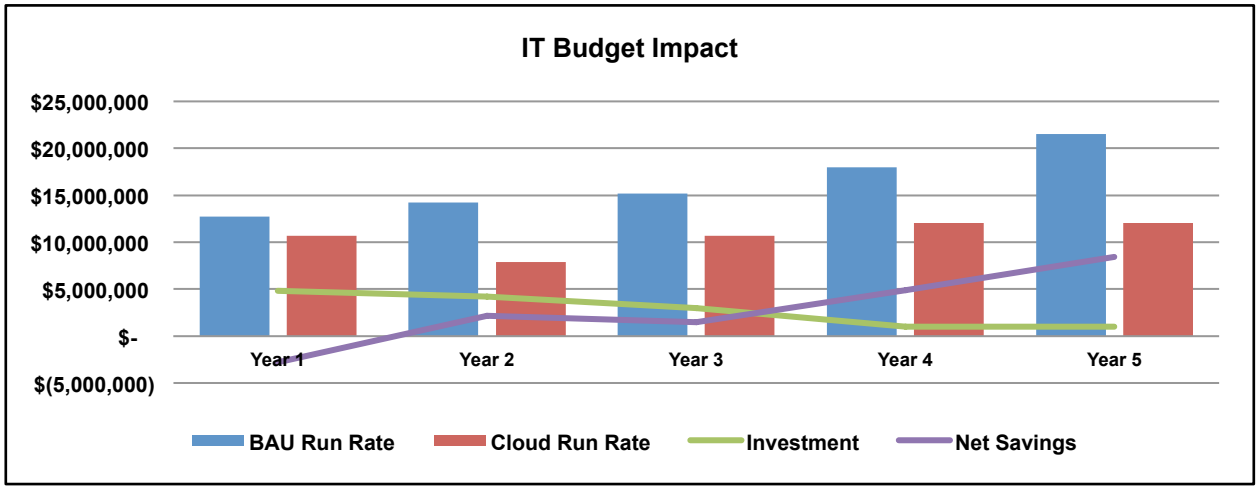
This organization wanted to understand the advantages of converged architectures for their major production sites. The cost of services for operating model transformation was included in the analysis to understand the total benefit. Table 5 shows the five-year metrics used to determine the ROI.

Table 5: Case Study 2 Five-Year Transformation Metrics

Metric	Year 1	Year 2	Year 3	Year 4	Year 5	5 Year Total
BAU Run Rate	$12,738,855	$14,266,015	$15,181,042	$17,978,083	$21,502,457	$81,666,451
Cloud Run Rate	$10,674,427	$7,878,170	$10,674,427	$12,072,555	$12,072,555	$53,372,134
Run Rate Savings	$2,064,428	$6,387,845	$4,506,615	$5,905,528	$9,429,902	$28,294,317
Capital Investment	$1,001,557	$1,001,557	$1,001,557	$1,001,557	$1,001,557	$5,007,785
Services Investment	$3,846,616	$3,231,616	$2,000,000	$0	$0	$9,078,232
Total Investment	$4,848,173	$4,233,173	$3,001,557	$1,001,557	$1,001,557	$14,086,017
Net Savings	($2,783,746)	$2,154,672	$1,505,057	$4,903,971	$8,428,345	$14,208,300

The projected Net Savings for this transformation is $14.2M (17 percent cost savings) with an NPV of $12.0M. Investment costs are $14.1M, with an NPV of $13.1M. The ROI is 101 percent, reflecting the moderate level of investment relative to the run rate savings. The Payback Period is 3.3 years. Figure 2 shows a graphical representation of the five-year impact on the IT budget.

Figure 2: Case Study 2 Five-Year IT Budget Impact



Key benefits of the transformation include improved agility and efficiency through automation, increased scalability through increased server virtualization and utilization, reduced provisioning time for production services from six to eight weeks to within one week through self-service and automated provisioning, and 33 percent of IT staff time reallocated to new initiatives.

CASE STUDY 3: REDUCING THE DATA CENTER FOOTPRINT AND OUTSOURCED OPERATIONS MANAGEMENT COSTS

This premier energy company had 15 data centers. An external provider managed the day-to-day operations such as monitoring services and systems, patching software, and racking and stacking equipment. In order to reduce the cost of the outsourced operations, as well as overall production costs, the organization wanted to consolidate their data centers running 400 specific applications from 15 to 7.

To address this, the IT organization was looking to implement a private cloud with Enterprise Hybrid Cloud deployed on mirrored Vblock systems for seven sites of various sizes. Key characteristics included:

- Self-service and automated provisioning to increase the speed in which IT is able to deliver services
- Resource elasticity to optimize resource utilization delaying the purchases of additional capacity

- Automated monitoring to improve availability as well as reduce the IT staff FTE effort
- Backup and recovery for data protection
- Replication and recovery for disaster recovery

CURRENT AND TARGET ENVIRONMENTS

The 400 in-scope applications were hosted on 1,900 servers across the 15 sites. These applications would be migrated to seven VCE Vblock systems across seven sites.

Development of an online service catalog, and modifying IT roles and processes were not in scope for the initial deployment. The focus was on infrastructure standardization, consolidation and automation, as well as the migration of the 400 applications.

The components of the current and target sites, specific to the proposed cloud transformation, are shown in Table 6.

Table 6: Case Study 3 Current and Target Environments

COMPONENT	CURRENT ENVIRONMENT	TARGET ENVIRONMENT
Sites	15	7
Servers	1900 servers	7 VCE Vblocks (various sizes)
Storage	10 Petabytes on Dell EMC VMAX	
Networking	Cisco networking	
Virtualization	Servers 60% virtualized with VMware	Servers 100% virtualized with VMware
Automation	VMware vRealize Automation	VMware vRealize Automation
Management/ Monitoring Tools	BMC PATROL	VMware vRealize Operations VMware vRealize Business
IT Staff FTEs	Vendor managed	Vendor managed – reduced contract by 25%
Backup/Recovery	Veritas NetBackup	Dell EMC Avamar Dell EMC Data Domain
Replication	IBM Spectrum Protect (Tivoli Storage Manager)	Dell EMC RecoverPoint

ROI ANALYSIS

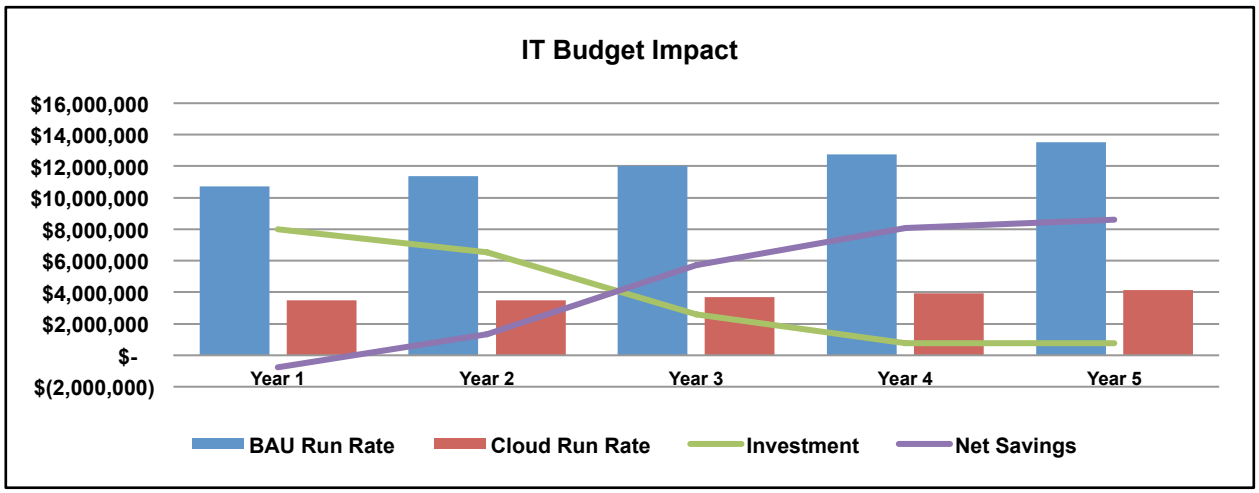
This organization was focused on the hardware and software savings, as well as reduced contract costs for outsourced operations management, that could be achieved through modernization and consolidation. There were parallel programs in place affecting the operating model and catalog services that were not included in the analysis. Table 7 shows the five-year metrics used to determine the ROI.

Table 7: Case Study 3 Five-Year Transformation Metrics

Metric	Year 1	Year 2	Year 3	Year 4	Year 5	5 Year Total
BAU Run Rate	$10,712,000	$11,354,720	$12,036,003	$12,758,163	$13,523,653	$60,384,540
Cloud Run Rate	$3,490,406	$3,490,406	$3,699,831	$3,921,820	$4,157,130	$18,759,593
Run Rate Savings	$7,221,594	$7,864,314	$8,336,173	$8,836,343	$9,366,524	$41,624,947
Capital Investment	$4,284,800	$2,838,680	$601,800	$0	$0	$7,725,280
Services Investment	$3,700,000	$3,700,000	$2,000,000	$750,000	$750,000	$10,900,000
Total Investment	$7,984,800	$6,538,680	$2,601,800	$750,000	$750,000	$18,625,280
Net Savings	($763,206)	$1,325,634	$5,734,372	$8,086,343	$8,616,524	$22,999,667

The projected Net Savings is $23M (38 percent cost savings) with an NPV of $20M. Investment costs are $18.6M, with an NPV of $17.5M. The resulting ROI is 123 percent, reflecting the low level of investment relative to the high run rate savings. The Payback Period is 2.4 years. Figure 3 shows a graphical representation of the five-year impact on the IT budget.

Figure 3: Case Study 3 Five-Year IT Budget Impact



Key benefits of the transformation include consolidation of 15 data centers to seven for the in-scope applications, improved efficiency through automation, increased scalability with 100% server virtualization, and 25 percent reduction in the contract cost for outsourced operations management.

SUMMARY

Moving to a private cloud can enable significant cost savings and benefits; however, the cost to get there will require an investment. Projecting the ROI of the transformation can help justify the costs and build consensus within the IT organization and the business.

There are many measurements involved in determining the ROI. Hard costs for components of both the current and target IT environment are needed. This includes hardware, software, infrastructure, networking, facilities, staff, fees for external services, and overhead costs. Transition costs including hardware, software, supplemental connectivity, staff and training costs are required. Another cost that should not be overlooked is opportunity cost.

In addition to ROI, there are other metrics that should be evaluated when assessing the business impact of cloud transformation. Two critical metrics are Net Savings and Payback Period. IT run rates (based on current and future TCO) and investment profiles are used to develop the Net Savings. This should be multi-year and expressed in terms of NPV. The Payback Period tells when the real savings from the transformation will take effect. Additional business value metrics, such as end-user satisfaction, increased productivity and time-to-market, should be taken into account as well.

Dell EMC Services has significant experience helping organizations define, plan and implement cloud transformations. We have expertise in developing detailed business cases that provide the cost savings and benefits of moving to the cloud (private, public and hybrid). Our analyses of dozens of organizations show an average savings of 18-26 percent; however, we have seen savings as high as 45 percent. Calculating the ROI for *your* cloud transformation can help prove the value and pave the way for faster adoption.

APPENDIX A: ADDITIONAL MEASUREMENTS OF BUSINESS VALUE

Examples of additional measurements and benefits of cloud transformation are shown below.

MEASUREMENT	BENEFITS
% Services Standardized	• The more standardized services are, the less effort there is to prepare and deliver them • Standardizing services enable automated orchestration
% Staff Reduced	• Standardized services and automation can reduce time needed to maintain the environment, enabling staff to be redeployed to other projects/tasks
% Servers Virtualized	• Increased optimization of resources • Increased scalability with high levels of utilization
% Desktops Virtualized	• The more desktops that are virtualized, the easier they are to manage • Standardized and centralized images are easier to maintain
% Images Reduced	• Reducing the complexity of the environment allows for more precise control, ease of patch management, speed of testing
% Services Automated	• Self-service and automated provisioning reduce manpower needed for provisioning and documenting, enabling staff to be redeployed to other projects/tasks
% Services Metered (SLA, Cost, Time)	• Enables better showback reporting and identification of unused resources • Charging business units for services used enables IT budget to become more consumption-funded • Provides capacity planning with the data it needs to determine best fit, right sizing and increased density opportunities for improved optimization and elasticity
% Increased Workload	• The ability to execute more work due to standardization and automation decreases backlogs
% Shared Components	• Development costs and purchases can be avoided if the service catalog identifies components which can be re-used or shared • Reducing or eliminating redundant resources decreases expenses
% Calls Resolved Level 1	• Increased issues resolved improves end user satisfaction
% Security Automated	• Automation of security speeds up the onboarding and off-boarding of resources saving administration and increasing resource productivity • Reduced risk
% Network Optimization	• Network optimization improves network performance, which can improve QoS and end-user productivity
% Reduced Days to Provision	• Automated provisioning results in faster delivery of services for increased productivity and improved end-user satisfaction
% Reduced Application Development Time	• Faster delivery of development environments shortens the software development life cycle and improves time to market

[1] IDG Research Services, Hybrid Cloud Computing, http://www.emc.com/collateral/analyst-reports/idg-research-hybrid-cloud-white-paper.pdf.

[2] Forrester Consulting, The Total Economic Impact of Private Cloud, https://marketing.dell.com/Global/FileLib/Forrester/The-total-economic-impact-of-private-cloud.pdf.