A framework for comparing CAPEX to OPEX storage alternatives

A framework drawn for senior executives

SUMMARY

Catalyst

Storage continues to be one of the significant growth areas of IT budget planning and spending. It is therefore not surprising this has become a continuing issue that demands senior executive attention.

Starting from humble beginnings, storage management has become a complex undertaking requiring the combined efforts of infrastructure architecture, financial management and software and applications management. In many enterprises, a good dose of human psychology and negotiation skills might also prove to be very useful.

The emergence of cloud storage offers significant hope for simplifying storage management and untangling the many and complex intersecting issues. However some cloud storage implementations could just add to the problem if they do not adequately address the legal and regulatory issues such as privacy, governance and data sovereignty.

While there is inevitability about the transition from asset ownership to cloud / as a service solutions or similar IT consumption-based models, the transition path is not necessarily easy.

The challenge is to find the right set of solutions that

- are fit for purpose given the particular technical, regulatory, and governance requirements
- provide a manageable transition path for existing legacy infrastructure
- enable future growth, evolution and flexibility

Given these market developments, CSC & EMC commissioned Ovum to provide independent facilitation for a series of senior executive workshops, each held in cities across Australia and Asia as well as phone interviews with other senior executives globally. The twin objectives of the workshops were to gain a better understanding of enterprise storage requirements from a CIO perspective; and to obtain independent feedback on CSC’s Storage as a Service offering.
This research paper provides a compilation of CIO insights gained through this process.

**Ovum view**

Today, the inevitability of Consumption based services has become well accepted. In the last 12 months, there has been a plethora of policy and strategy documents, each declaring that cloud like services are firmly on the enterprise strategic radar. However, commitment to an objective is still a long way from making it happen.

The challenge is no longer if we should transition to these services but how we should do it. Transition challenges should not be underestimated. There are legacy systems to consider. There are hardware assets that are not yet fully depreciated, and there are regulatory and governance requirements that are currently designed around asset ownership and onshore data sovereignty.

There is a clear and growing view that there is no one size fits all solution that will bridge the gap between theory and reality.

The recent series of CIO workshops underlined the challenges ahead, and particularly the need for a clear framework for comparing existing CAPEX based solutions with the various OPEX or “as-a-service” offerings.

The discussions also confirmed that CSC’s Storage as a Service solution does offer a credible alternative that addresses many of the practical issues being faced by CIOs.

In particular:

- For many organizations, the move to Infrastructure as a Service is a big step. Singling out storage for initial attention provides companies the ability to deal with the specific economics of storage without needing at the same time to also address the complexity of servers, software and production scheduling.
- By focusing on a particular technology it is easier to measure success and harvest quick benefits, particularly as different assets will depreciate and come up for replacement at different times.
- Data sovereignty is still a problem for some highly regulated industry sectors. The option for a managed service within the existing data center, provides comfort for the auditors while still delivering some of the savings and flexibility of a cloud service. An on premise solution is a standard deployment option within the CSC offering.

**Key messages**

- The rigidities of asset ownership place unsustainable limitations on IT efficiency and effectiveness. The transition to some form of an as-a-service consumption model is inevitable.
- Some solutions may not adequately address regulatory and governance requirements, particularly in regulated industries. Care should be taken when comparing particular service offerings.
• There is a need for a clear framework for comparing existing systems to the various solutions on offer. By itself, cost per gigabyte is not a sufficient measure.

• It is not necessary to do everything at once. Improved management of storage might very well be a practical starting point for many enterprises.

THE CHANGING DRIVERS OF DATA GROWTH

Volume + Variety = Complexity

Managing data storage is becoming an increasingly complex activity. The exponential growth in data storage is already well documented and has already been the subject of significant analysis. Indeed, it is now one of the enduring rules of thumb for enterprise IT.

However, recent interviews with CIOs reveal a much more complex story, and it is this complexity that is driving future growth. One CIO remarked, “I can easily understand and plan for known data growth rates. The really scary issue is the growth in new systems and the unexpected data storage requirements that happen as a consequence”.

Consider the following:

• Data consolidation continues to produce many surprises. A number of enterprises are still consolidating data previously held in remote locations. Much of this data was locally managed with few formal controls. “It’s a wild west out there”, remarked one CIO. “As we consolidate servers we discover new requirements. We need to introduce a proper governance regime and this creates unexpected and unbudgeted overheads.”

• Advanced analytics and Big Data are bringing new requirements. Analytics is being pushed in new ways due to the explosion in mobile devices and social media. Big Data is emerging in the enterprise as a serious issue and competitive differentiator. A big challenge is the variety of data not just the volume.

• Relatively inexpensive network enabled sensors are becoming very popular in a number of sectors such as primary industry, emergency services, health, and local government. These are driving a new explosion in data outputs.

• Regulatory and legal issues around records management are creating requirements to keep data longer, and to manage it through much more formal mechanisms.

Reinventing data archive

Together all these changes are driving new requirements for data archiving. There is a growing tension between the Big Data view that all data is good data, and the growing calls from privacy advocates who want to limit growth in non-core data holdings. CIOs are increasingly finding themselves at the centre of some tough data policy discussions.

Successful CIOs are taking a bullish approach to data archiving, built around three key principles:
1. If the data is not about to change, it should be moved to archive as soon as possible.

   Archive is not just for historical or unused data. It is also an ideal candidate for storing the growing volumes of read-only data. For example, Big Data and Sensor Data typically do not change, and can be more efficiently stored on a readily accessible archive than on more expensive storage designed for efficient update. By putting data in the right place at source, there is an immediate saving in data backup costs and overhead.

2. If the data is at end of life, it should be deleted immediately.

   One of the interviewed CIOs declared: “The archives people are my new best friends”. In a world where it is increasingly difficult to delete anything, CIOs can take some comfort through the rigorous application of corporate data retention policies. Data should be retained until its scheduled deletion date and not one day longer.

   Given an increasingly litigious society as well as increased focus on the privacy of personal information, the CIO can easily become legally exposed by not paying close attention to corporate policy. This simple but rigorous approach has delivered significant reductions in data holdings.

3. Data management rules will quickly change and evolve...plan for it.

   Data management will continue to be the topic of energetic business and policy discussion. It is also likely that corporate perspectives on the value of data will change significantly over time, particularly as Big Data systems begin to move into full production. Successful CIOs will need to stay on top of these changes by implementing a flexible management regime that can be easily codified. Increasingly, this is becoming a specialist task and an ideal candidate for moving to an external entity to manage.

LIFTING THE LID ON THE STORAGE ECONOMICS

Is CAPEX a CIO’s friend or foe?

Information technology could very well be one of the last parts of the enterprise to transition from CAPEX based ownership of assets, to the management of flexible service arrangements through OPEX. Today's enterprises have already stripped from the balance sheet many of their non-core assets, in order to free up investment and drive agility. Today, it is common to find an enterprise that no longer owns its buildings, plant, equipment and car fleets. Indeed, as we walk into the foyer of most corporate headquarters, most enterprises do not even own the potted plants and flowers adorning their office.

IT outsourcing provided the first opportunity to truly operationalize infrastructure assets in the enterprise, however many IT outsourcing contracts simply transferred the rigidities of internal IT to a new supplier, and did not fully realize the potential advantages.
Asset ownership has provided some comfort for some cash strapped CIOs as audit rules make it difficult to remove assets or the provision for depreciation, without formal processes. However this dubious advantage is diminishing, as Chief Financial Officers look more closely at these fixed assets and the financial rigidities that come with them.

But the CFO is not the only person in the enterprise to focus on the cost of asset ownership. Business areas have become increasingly unhappy with procurement delays and the opportunity cost created by these delays. As organisations strive to become more agile and responsive to customer needs, project delays are seen as a significant inhibitor that weighs heavily against any financial savings made through IT procurement. Shadow budgets are now a reality for many enterprises. Business areas, frustrated by IT delays, choose to go their own way and buy their own IT solutions using cloud services.

The time has come to look beyond asset ownership as the best way of delivering efficient and effective IT solutions. Cloud and other utility services are appearing more and more on the CIO radar. The big challenge is to ensure data privacy and governance is not sacrificed in order to drive agility and flexibility.

**The cost of CAPEX storage is not just the cost per gigabyte**

The most commonly quoted price for storage is cost per gigabyte. Volume based pricing is a simple measure that is easily understood, however it is a long way from the real cost of storage. The most obvious shortcoming with this approach relates to utilization rates. Unused or underutilised disk space represents a sunk cost, and must be reflected in the average cost of utilised space.

The following case study interview with one CIO clearly illustrates the problem:
The CIO remarked that their enterprise had no problem with unscheduled storage requirements because they kept a significant amount of unused storage in reserve. However the overhead of unused storage was never amortized across the enterprise. The cost per gigabyte was kept artificially low by not recognising this expensive overhead.

**The expected cost of CAPEX storage is frequently not the cost you pay**

Despite best efforts, real life is frequently unpredictable, no matter how much planning and analysis is performed. CIOs who encounter these big gaps between theory and reality, can breathe a sigh of relief. They are not alone. A number of the interviewed CIOs reported a similar problem, no matter how much effort is put into planning.

Consider the following case studies:

**Case study: Feast and then famine**

One CIO from the government sector reported the following case study. Storage is procured in bulk at the beginning of each financial year. Annual procurement works well for them because it minimises the overheads associated with procurement management and it allows them to
negotiate a favourable price. It also allows them to quickly respond to urgent requests by servicing these requests from the storage pool.

However, planned requirements rarely match reality. Annual procurement delivers excess capacity at the beginning of the financial year, so it is easy to approve storage business cases. Toward the end of the year, life becomes tough as the free storage pool begins to run dry.

Also, those carefully negotiated prices begin to lose their appeal throughout the year. The storage market is quite volatile, so prices typically drop through the year. Early purchase of such assets becomes less appealing for an asset that diminishes in price, particularly when this creates long term maintenance costs for that asset.

Case study: Purchasing storage at any price

Another CIO also outlined a similar story about carefully negotiated prices. This delivered cost effective storage, however all that rigor went out the door when emergency requirements emerged. Typically this was not the result of poor IT planning, but the changing business needs of an agile enterprise. The CIO reported the enormous pressure to deliver outcomes that address legitimate requirements. “At that point in time”, the CIO said, “we’ll pay anything for fast delivery. IT cost savings go out the door!”

Case study: The procurement merry-go-round

The procurement cycle for storage is surprisingly complex. It is driven by many factors - some logical and some quite illogical. One manager explained the typical procurement cycle in the following way. Of course, every organisation will be different, but the following case study provides a useful yardstick:

Year 1

- A storage frame is purchased with an expected life of four years
- The frame is not fully populated to provide space for expansion at short notice
- No maintenance is paid, as the frame is under warranty

Year 2

- No maintenance is payable as this has been negotiated into the purchase cost of the frame
- During year 2, a storage upgrade is purchased, with similar arrangements for a two year honeymoon on maintenance.

Year 3

- Maintenance costs commence, making a trade-in for a new frame an attractive option
- A new frame is purchased from the current supplier due to the favourable trade-in options
- At this point, the frame still has one year’s depreciation remaining, and the new storage upgrade has three years remaining.
In the above case study, the customer is incentivized to turn over their storage at a faster rate in the same way mobile phone companies incentivize their customers to regularly upgrade their phones. Regular upgrades deliver an advantage for the supplier because they do not need to maintain older equipment, even if there is still life and value left in the old equipment.

However, a number of outsourcers and cloud providers are not motivated by the same financial incentives and tend to work their storage frames longer and harder in order to achieve underlying cost savings.

**A FRAMEWORK FOR COMPARING CAPEX AND OPEX STORAGE ALTERNATIVES**

As enterprises shift their focus from internal ownership of IT assets to “as-a-service” based models on cloud infrastructure, it is necessary to find a better way of drawing direct comparisons. Some solution providers take a simple approach by quoting cost per gigabyte within class of storage.

While simple measures are desirable, and indeed inevitable, it is still necessary to undertake some more rigorous cost analysis to ensure the comparisons are indeed like for like.

The Tables below provide a framework for comparing CAPEX and OPEX based solutions while still recognizing the unique advantages of each solution. Table 1 provides a direct comparison of hardware and software, while Table 2 addresses management and governance issues. The tables can be used as a checklist to ensure key requirements are not overlooked, or they can be used as a method of creating a comprehensive cost comparison.

Notes:

- Typically “as-a-service” solutions are quoted with many of these items rolled up into a single charge. It is not necessary to disaggregate these charges, but to simply ensure they are addressed at an acceptable level.

- While one “as-a-service” solution may appear to be cost effective, it may achieve this at the expense of key services. The framework below is designed to address such issues.
Table 1 – Allocating costs for CAPEX vs OPEX storage – Hardware/Software

<table>
<thead>
<tr>
<th>Cost item</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Storage hardware/software costs</td>
<td>Storage frames might not be purchased fully populated. Future capacity upgrades are likely to have a shorter useful life as the entire configuration will need to be written down when the storage frame is eventually replaced.</td>
</tr>
<tr>
<td>Storage utilization</td>
<td>Unused or underutilized storage needs to be fully recognized as a cost overhead. These costs need to be distributed pro rata across the allocated storage otherwise the TCO model is flawed.</td>
</tr>
<tr>
<td>Maintaining service levels</td>
<td>Hardware/software costs need to reflect the configuration necessary to deliver the performance levels appropriate for a particular storage class. As new hardware is added there is an impact on maintenance levels to ensure existing hardware works with the new infrastructure. This adds to the transition costs and time table requirements. These costs need to be captured.</td>
</tr>
<tr>
<td>Maintenance - Hardware/Software costs</td>
<td>Typically there is a maintenance honeymoon while the hardware is under warranty. Maintenance costs frequently go up significantly as the hardware ages. Cost allocation must take account of actual costs over the life of the asset.</td>
</tr>
<tr>
<td>Depreciation</td>
<td>Depreciation will need to be taken into account based on local accounting standards. Disposal value will also need to be taken into account if applicable. Frequently however, disposal value works in the opposite direction because the asset's useful life is less than its period of depreciation, resulting in a significant value write down.</td>
</tr>
<tr>
<td>Change-over cost</td>
<td>This includes costs of commissioning and decommissioning of the hardware.</td>
</tr>
<tr>
<td>Potential tax costs/benefits</td>
<td>This will depend significantly on the company's local accounting standards.</td>
</tr>
<tr>
<td>Cost of emergency storage purchases</td>
<td>Most organizations have a good understanding of their average storage growth rates. However most also admit to being frequently caught out by unforeseen requirements. These are typically accommodated by emergency purchases (paid at premium prices) or by holding unused storage in reserve. Either way, this represents a significant cost.</td>
</tr>
</tbody>
</table>

Source: Ovum
### Table 2 – Allocating costs for CAPEX vs OPEX storage – Management & Governance

<table>
<thead>
<tr>
<th>Cost item</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Opportunity costs:</strong></td>
<td></td>
</tr>
<tr>
<td>Cost of project delays</td>
<td>The business cost of delays if appropriate storage cannot be delivered on time</td>
</tr>
<tr>
<td><strong>Staff cost to manage the storage</strong></td>
<td>As a rule of thumb, storage management costs can be assumed to decline at 6% to 8% per annum due to improved hardware &amp; software productivity features. However, given storage backup requirements can rise by 30% to 50% per year, management costs can be expected to rise significantly, year on year. As a rule of thumb, typical storage management overheads in 2013 were:</td>
</tr>
<tr>
<td></td>
<td>- 1 person for each 250TB of high end storage</td>
</tr>
<tr>
<td></td>
<td>- 1 person for each 1000TB of archive storage</td>
</tr>
<tr>
<td><strong>Disaster Recovery &amp; Business Continuity</strong></td>
<td>Costs must be distributed pro rata across allocated storage by storage class</td>
</tr>
<tr>
<td><strong>Training</strong></td>
<td>Storage management expertise is increasingly becoming difficult to find and retain. Costs typically show up as increased staff training or increased pay rates to contractors. There is also a potential on project delay and associated costs.</td>
</tr>
<tr>
<td><strong>Costs of meeting regulatory &amp; corporate requirements for data privacy &amp; security</strong></td>
<td>Does the service provider meet regulatory requirements as part of their standard offering? If not, what additional work needs to be costed into the solution in order to meet these standards?</td>
</tr>
<tr>
<td><strong>Costs of meeting regulatory &amp; corporate requirements for data backup &amp; archive</strong></td>
<td>(as above)</td>
</tr>
<tr>
<td><strong>Data Centre floor space</strong></td>
<td>Having already purchased Data Centre space, individual allocations are typically treated as a free good. However the cost must be taken into account pro rata if a true comparison is to be made with alternate solutions such as &quot;as-a-service&quot;</td>
</tr>
</tbody>
</table>

Source: Ovum
FUTURE DIRECTIONS IN STORAGE MANAGEMENT

There was once a time when a person could go to the data centre and point to the specific location where their data was being held. There were even labels on disk drives that identified them by name. Those days have long gone. Data striping and other aggregation methods have abstracted the relationship between data and hardware. As the requirements for greater performance and availability continue to grow, the pressure for further abstraction continues to grow.

This is nothing new in the world of Information and Communications Technology. Software Defined Networks are now a hot topic in the telecommunications industry. Layers of software define the constructs and behaviour of networks in real time. Network management is fast moving to a high level technical role that is far removed from its origins of stringing cables and connecting boxes.

The same is now happening in the data centre. New directions, such as the Software Defined Data Centre, are further driving abstraction and specialization in the way we manage infrastructure.

The provided framework delivers a method for senior executives to ensure that nothing is forgotten and that planned benefits are quantifiable and measurable, irrespective of the chosen solution.
APPENDIX

Methodology

- Existing literature was reviewed
- Detailed discussions were undertaken with international CSC representatives
- Senior executive input was sought through two hour senior executive workshops held in seven cities in Australia and Asia
- Further feedback was sought through phone interviews with individual CIOs and senior executives worldwide.

Author

Kevin Noonan,
Research Director, Public Sector

Email: kevin.noonan@ovum.com
LinkedIn: http://www.linkedin.com/in/kevinnoonan
Twitter: noonan_kevin

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