

## STORAGE VIRTUALIZATION:

### A FOUNDATION FOR ECONOMICALLY SUPERIOR STORAGE ARCHITECTURES

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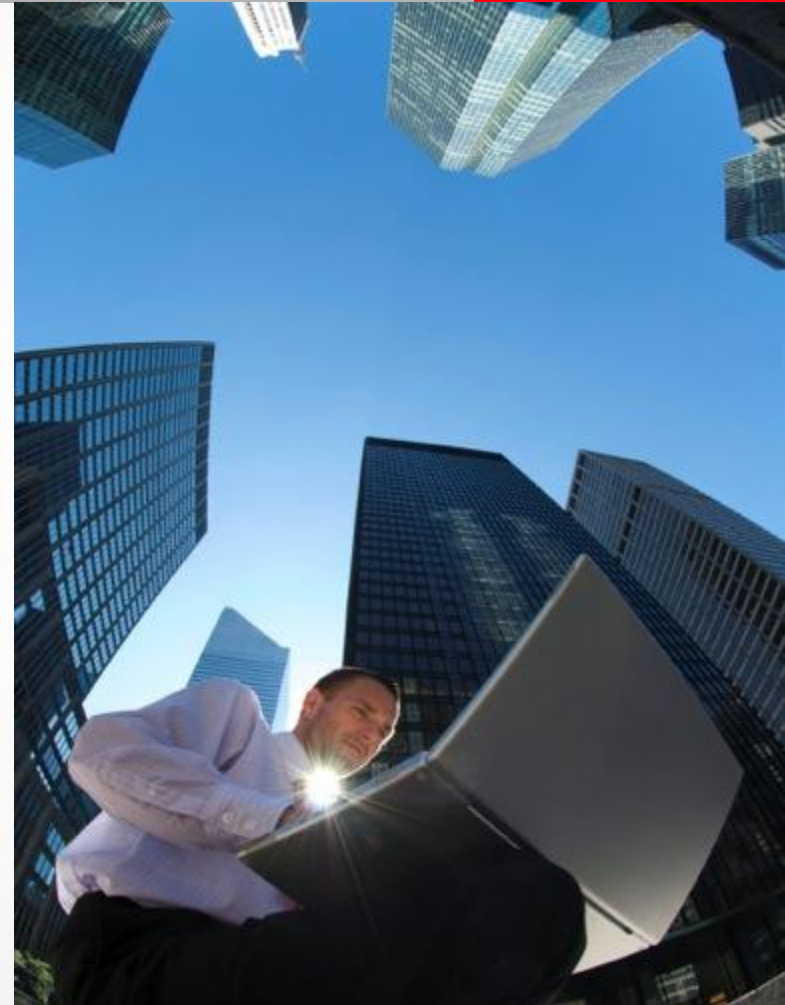
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## *What is Storage Economics?*

- **The application of economic and financial principles to storage**
  - Identify, measure and reduce storage costs
  - Defining economically superior storage architectures
  - Alignment of these architectures to future roadmaps and technological standards
  - Cost reduction through operational excellence
- **The measurement and comparison of TCO among existing and new technologies**
- **The separation of price and cost in decision making**
  - Differentiating between the cost of acquisition and the cost of ownership



## **An Essential Cost Reduction Strategy can Include**

Reduce total cost of ownership (TCO)

Improve return on investment (ROI)

Improve return on assets (ROA)

## Price does not equal cost

- Purchase price is only 15-20% of the TCO
- Planners need a holistic view of costs as disk price continues to erode

## There are some 34 different types of cost for storage TCO

- Most costs are paid by various, different organizations in the company
- Some costs are soft - therefore harder to quantify & make actionable

## Econometrics are needed to plan for and deliver efficiencies

- You cannot improve what you cannot measure – metrics are essential

## There are economically superior architectures

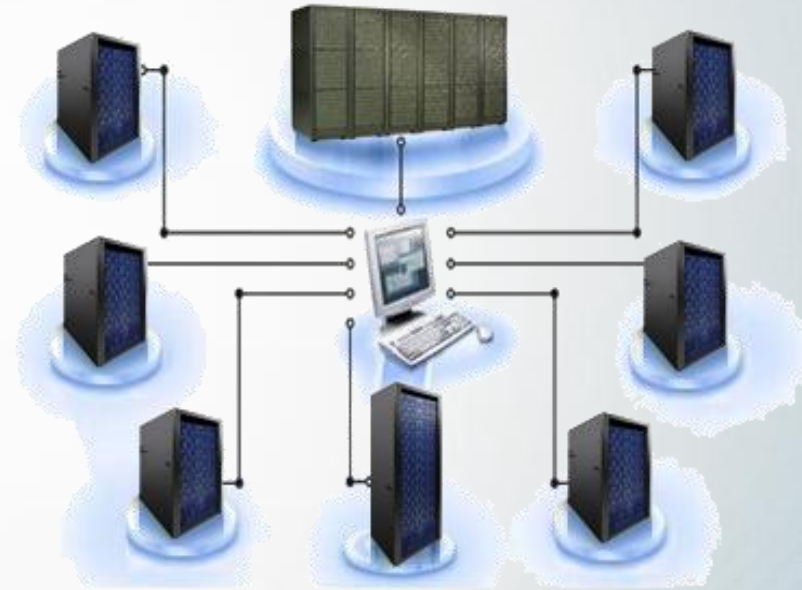
- Key ingredients include: [Virtualization](#), dynamic provisioning, dynamic tiered storage, 3D scaling, common admin, SSD, de-dupe, active archive, VTL, Cloud storage, CoD, MSU, Converged Systems

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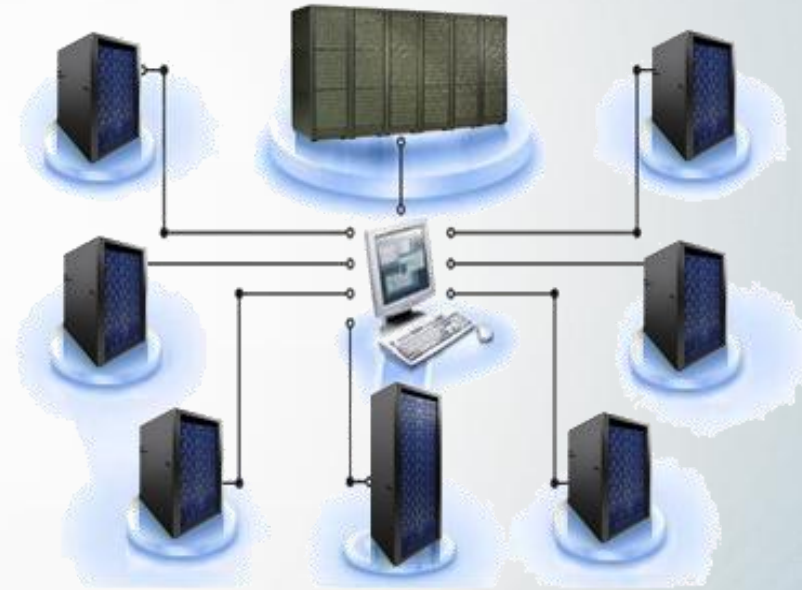


# What is Storage Virtualization?

- Disassociates physical hardware from system usage
- Creates a “pool” of data with common management and administration
- Provides operational flexibility and utilization efficiency



- Aggregate Heterogeneous storage
- Provides common, enterprise storage and data services for lower level, lower cost storage
- Adds no complexity or latency
- Is not limited to SAN connection
- Preserves end-to-end security
- Add future capabilities to storage controller
- Provides a Return on existing as well as new assets - ROA



## Virtualized Storage



- All servers access the same pool of storage with common management and services
- The pool of storage can span multiple vendor storage
- No stranded storage – all storage capacity is available to all servers
- Data can be moved across storage frames without disruption to the application

## Non-Virtualized Storage

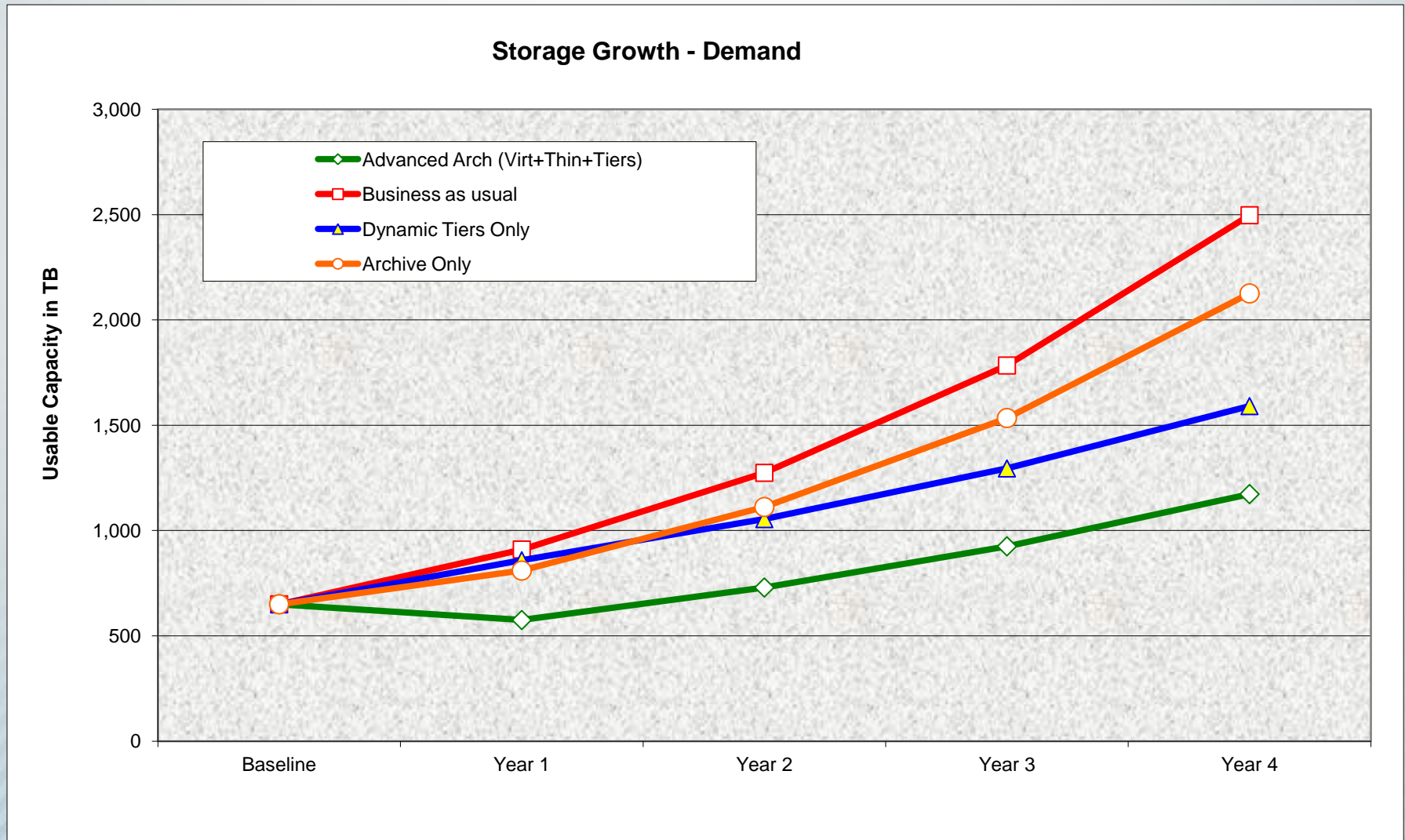


- Servers and storage operate in silos with separate management and services
- Capacity can not be shared between storage frames
- Stranded storage – capacity may be available for new requests, but it is not in the right place
- Data movement between storage frames requires the application to be stopped during the data movement

# Costs reduced with Storage Virtualization

1. **Hardware/software maintenance** — virtualized assets can often ‘drop’ most SW maintenance as they inherit the controller’s features and fn. Consolidation results in older arrays being retired saving HW maintenance
2. **Storage management labor** — Management labor costs associated with heterogeneous storage management, such as provisioning, tuning, load balancing, troubleshooting and upgrades. 5-10% impact is probable
3. **Power consumption and cooling** — reduced environmentals through better utilization, reduced waste and # of arrays
4. **Data Center Floor Space** — consolidation and reclamation will yield better asset utilization and reduce # of arrays
5. **Cost of waste** — two types: usable and not allocated, and allocated and not used. Virtualization based reclamation is typically in the 20-40% range
6. **Cost of Migration** - Host and application un-aware movement of data and applications. Virtualization can reduce this cost by 70-90%
7. **Cost of growth** — compounded impact of virtual storage, tiering and thin provisioning can fundamentally change the appetite curve for storage capacity

# CREATING NEW APPETITE CURVES



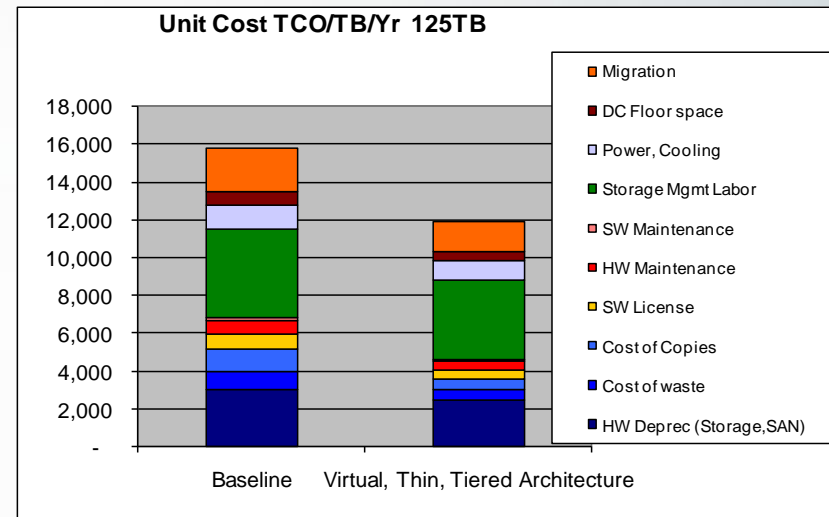
## ■ Common infrastructure problems

- Current islands of SAN and DAS are unsustainable
- Technology refresh takes months
- Utilization of allocated space is 20% - 30%

**In order to drive down unit costs, new storage architectures have to be employed**

## ■ An Economic Triumvirate

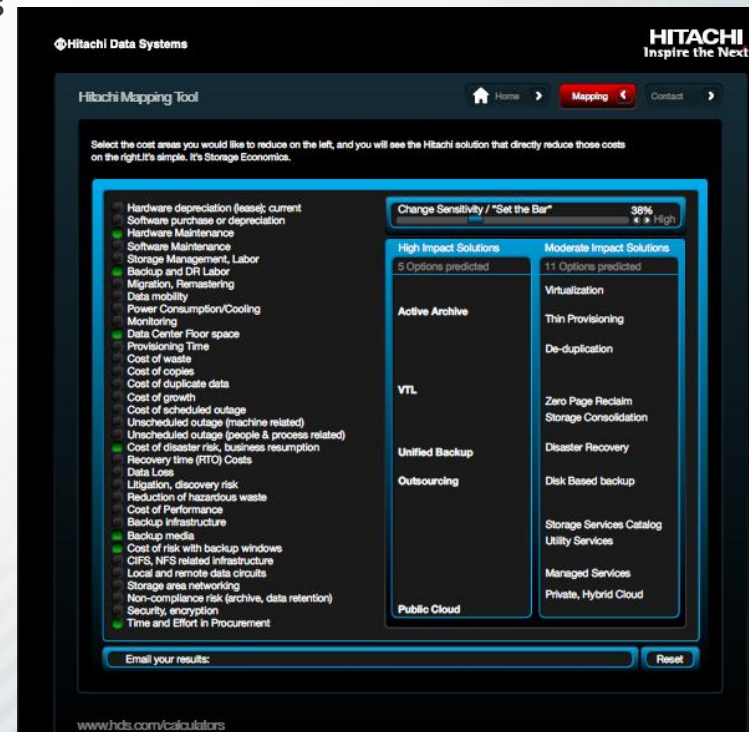
- **Storage Virtualization** – in the controller
  - Reclaimed space, better aggregate utilization, better mgmt
  - Significant time and cost savings with data/array-based migration
- **Dynamic Tiering**
  - Data mobility within the tiers, policy-based
  - Move and tier the copies!
- **Dynamic Provisioning** (thin provisioning)
  - Space reclamation, wide striping and very fast provisioning
  - Flexible, on-demand capacities, pay as you go, virtual assets for the cloud



## Applying Storage Economics to help you identify, measure a & reduce costs

- Your solutions will be driven by your cost sensitivities
  - See the HDS Cost and Solutions Mapping tool
  - White Paper on Storage Economics
  - White Paper on Virtualization Economics
  - White Paper on the cost of migrations (various methods including virtualization)
  - [www.ECONOMIZEYOURSTORAGE.com](http://www.ECONOMIZEYOURSTORAGE.com)
  
- Virtualization is not the only ingredient to reduce unit cost of storage, but is often a foundation element for sustained improvement
  
- Significant impact related to several costs:
 

<p>Migration</p> <p>Waste</p> <p>Growth</p>	<p>Management</p> <p>Environmentals</p> <p>Maintenance Fees</p>
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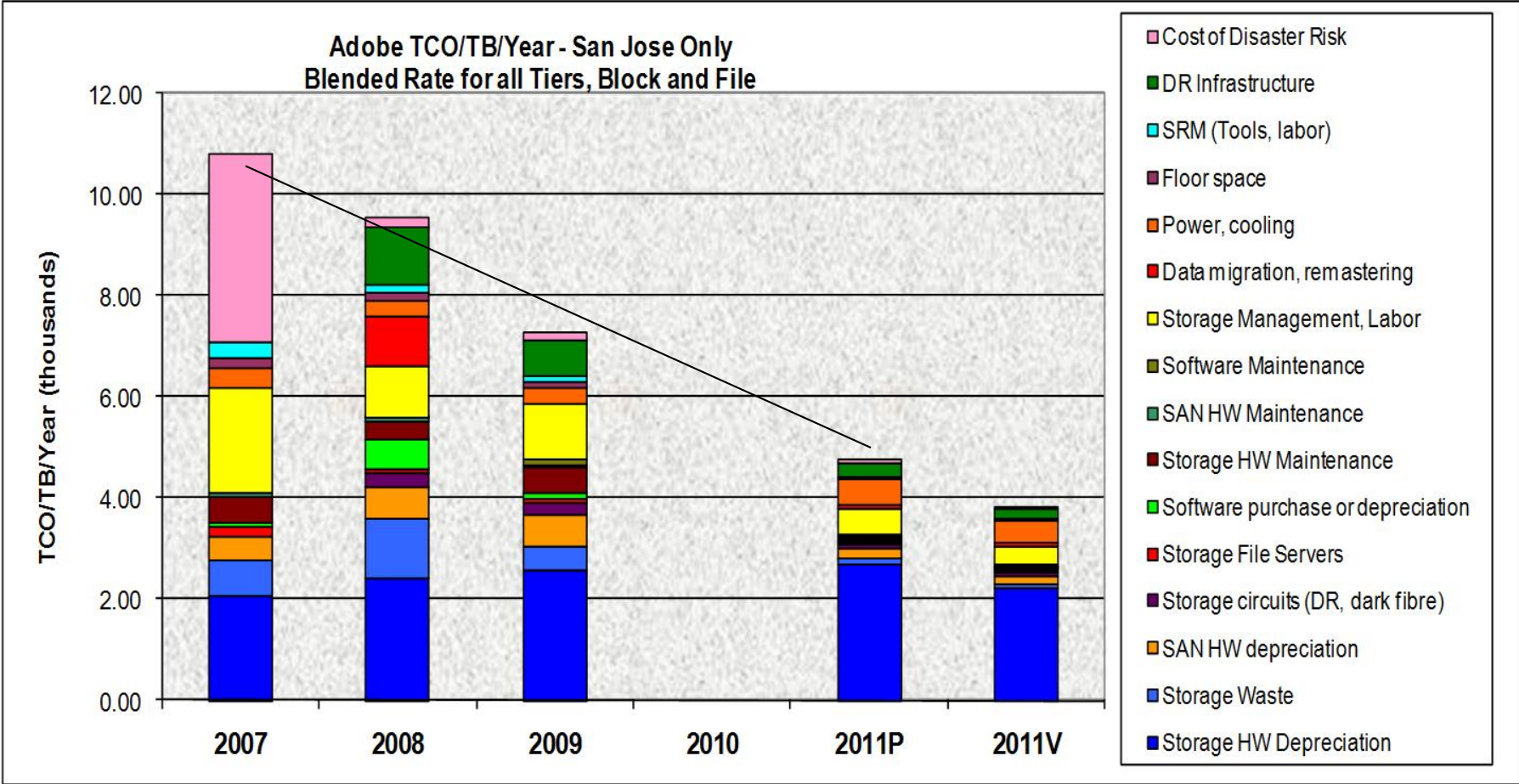


# Realizing the Benefits of Storage Virtualization

Paulette Scheffer / Sr. Director Core Infrastructure and Service Management

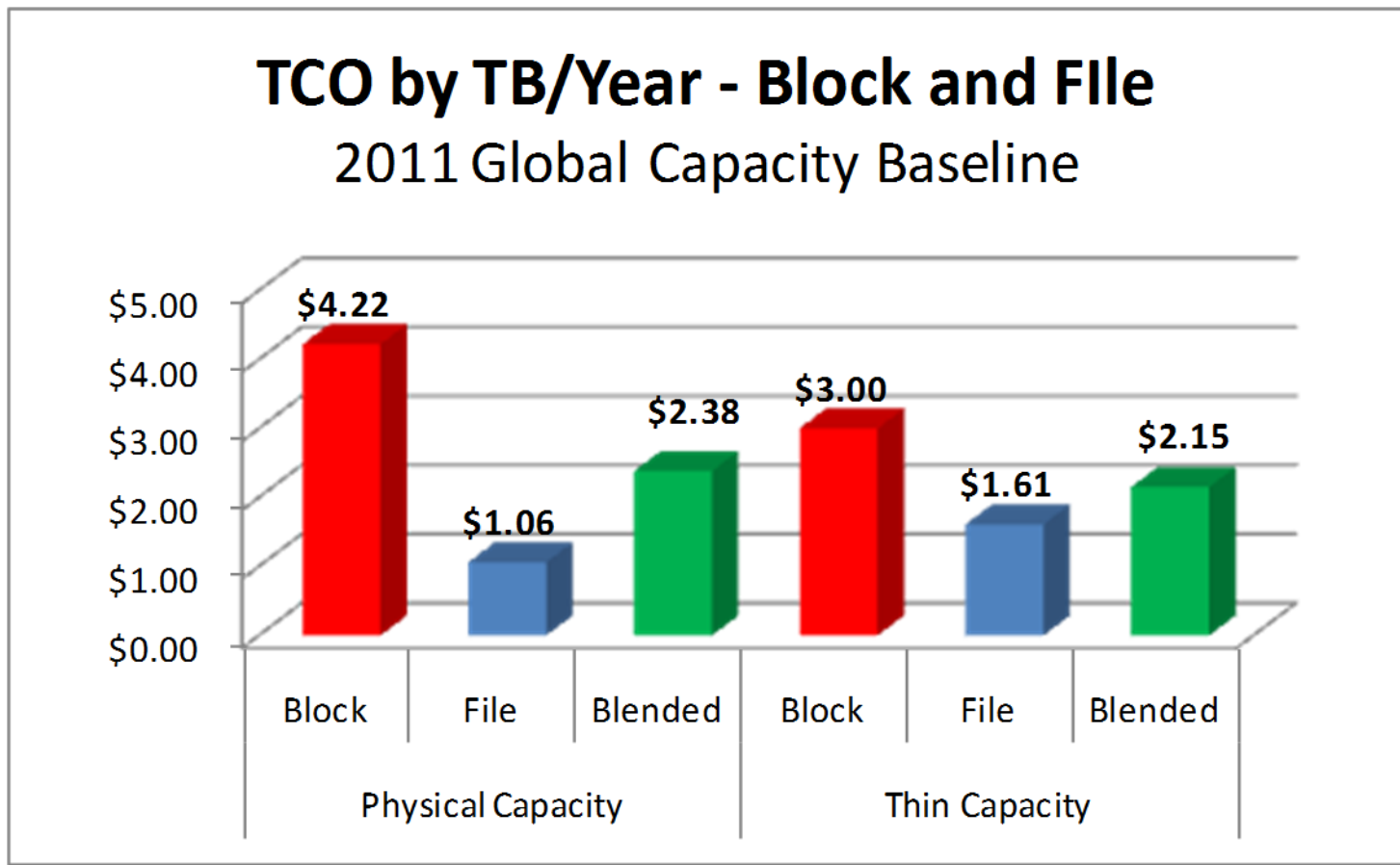


# Adobe Storage TCO

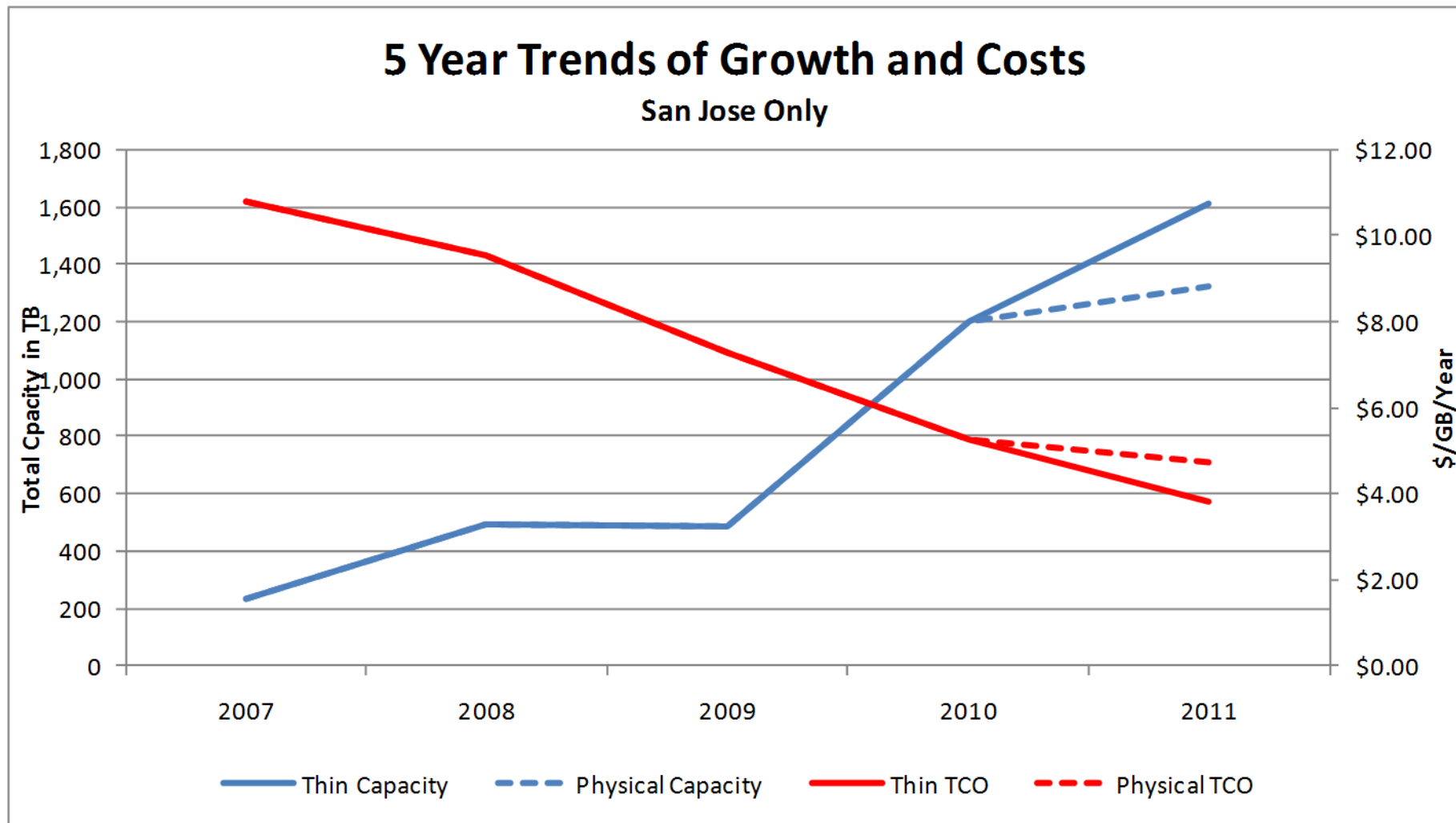


64 % average growth per year from 2008 to 2010

# 2011 Global Baseline – Block, File and Blended TCO



# 5 Year Trend: Capacity and Cost



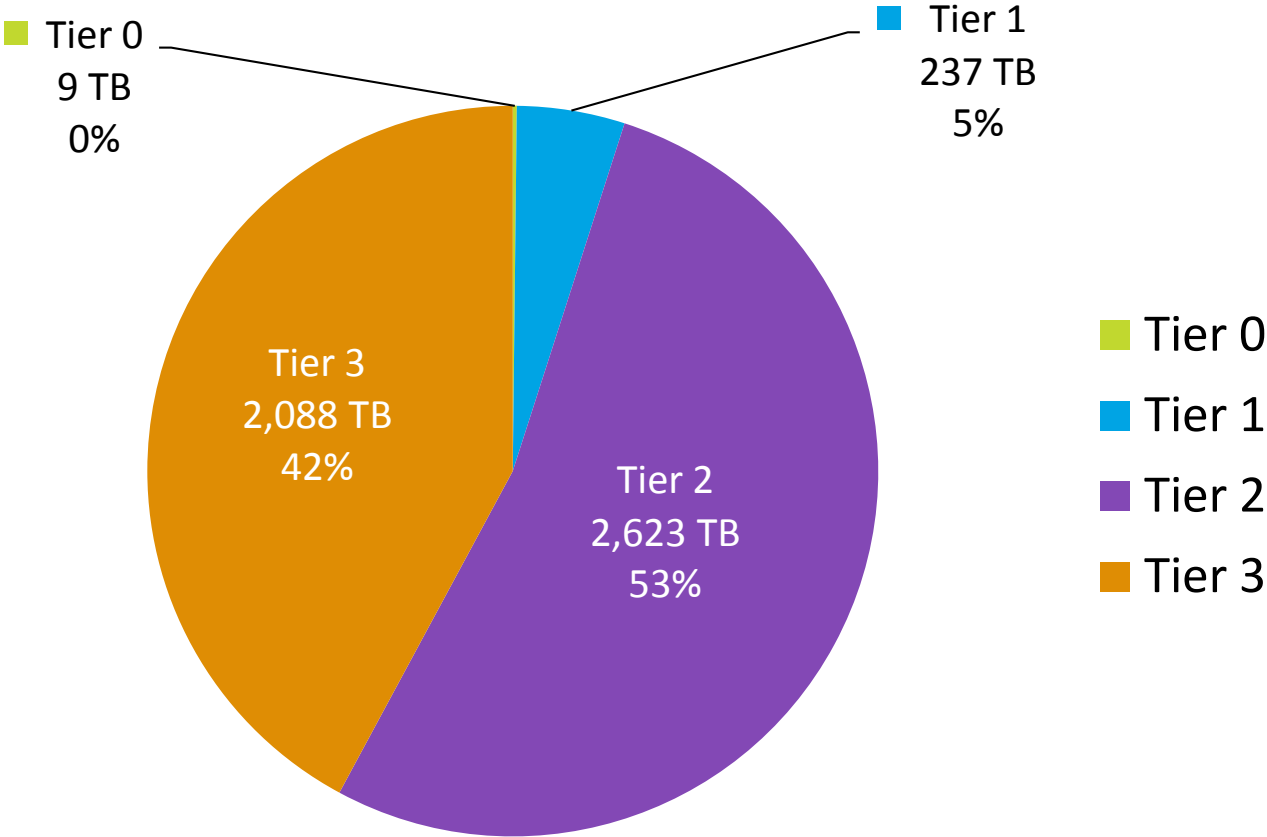
2010 Capacity and TCO numbers are estimated – no measurements in this year

# Adobe Storage Journey

- 2006 – 2008
  - Introduced storage classification and SATA drives in production
  - DR site implemented
  - Introduction of NAS filer to replace file servers
- 2008 – 2009
  - Implemented storage virtualization platform for tier 1 & 2
  - Began using Dynamic Storage Tiering
  - Clustered Storage introduction to storage portfolio (Isilon)
  - Implemented backup data de-duplication
- 2009 – 2011
  - Thin Provisioning and over-subscription implemented in production... for everything
  - File server consolidation completed globally
  - Implemented Snapshots based data protection for large data stores (Isilon clusters)
  - Storage Virtualization journey continues
  - Introduced SSD for production SAP data

# Current Storage Landscape at Adobe

## Primary Storage - Tier Distribution



# Adobe Storage Journey... What's Next

- Execute Unified Data Protection strategy- Implement advanced data protection technologies & eliminate tape backup
- Leverage SSD more broadly to lower TCO
- Implement storage chargeback to drive responsible consumption behaviors
- Implement primary storage data de-duplication
- Leverage cloud storage where appropriate
- Implement FCoE ( Fiber Channel over Ethernet) & iSCSI over 10G

# Adobe Storage Best practices

- Execute against an evergreen strategy
- Ruthless standards based on limited number of suppliers
- Virtualize first and when that doesn't work try again...
- Continuous optimization... requires strong capacity management practices
- Measure our performance and closely manage our TCO



Questions