

THE ECONOMICS OF STORAGE VIRTUALIZATION



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FEBRUARY 1, 2012

David Merrill, Chief Economist

February

- **Reduce Costs by Eliminating Backups and Dependence on Local Storage at the Edge**, February 8, 9 a.m. PT, 12 p.m. ET
- **Improve Cloud Adoption with Converged Infrastructure Solutions from Hitachi Data Systems and Brocade**, February 22, 9 a.m. PT, 12 p.m. ET

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- **Lower Your Virtual Machine Costs with an Economical New Framework**, April 11, 9 a.m. PT, 12 p.m. ET

Please check www.hds.com/webtech for:

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“Managing Rising Disk Prices with Storage Virtualization”
Recording available at www.hds.com/webtech



The Economics of Storage Virtualization

Virtualization in the data center is a stable and proven approach to make IT more efficient, from desktops to servers and from networks to storage. Whether storage virtualization is host-based, controller-based or through an appliance, it is a core ingredient in economical IT architectures. As with most new technology investments, you need a clear understanding of benefits versus costs. When you can project a positive ROI and fast payback, your projects gain more traction with IT management. Storage virtualization is a critical element for any organization that wants to significantly reduce unit costs in 2012.

Does storage virtualization make sense for you and your storage environment now? Are there economic benefits for you in this technology? What benefits and cost metrics do you need to build your own business case for Storage Economics? Are you aware of the compound advantage that storage virtualization and server virtualization make on your data center operations and costs?

Join David Merrill, Hitachi Data Systems chief economist and global business consultant, to understand

- Types of costs that virtualization can directly address (and reduce)
- Qualitative benefits of virtualization and how to convert them to cost savings
- Quantitative methods to measure and predict cost savings of virtualization in data migration, space reclamation, storage management tools, storage management effort and consolidations
- Qualitative impact of combining server, desktop and storage virtualization
- Cost savings by large and small IT organizations around the world through virtualization of their storage infrastructures



- 2012 global economics
- Capacity efficiency problem
- Storage Economics principles
- Map virtualization to money
- Virtualization solutions and resulting cost impact
- Case studies
- Q&A session

**IT IS CHEAPER FOR YOU TO VIRTUALIZE AND RECLAIM
THAN TO PURCHASE THAT CAPACITY**

- Unprecedented geological event caused worldwide disk shortage, resulting in
 - Limited availability and increased price of HDD
 - Compromised growth and business disruption
 - Forecasting challenges
 - Missed sales and revenue targets
- *Shortage may persist into 2013*, creating immediate need for increased capacity efficiency worldwide via
 - Increased storage utilization
 - Capacity purchase deferral
 - Capacity reclamation
 - Extension of useful life of existing assets

- **Aging IT systems and infrastructures**
 - Increasing burden to maintain
 - Switching to new systems and infrastructure becomes more disruptive and resource-intensive
- **Information becomes increasingly difficult to access and analyze**
 - Business is forced to work without the information it needs to make decisions
- **New interfaces drive up transaction loads and require legacy storage systems to scale up**
 - Storage systems are long-term investments and changes are increasingly painful and expensive
- **Compliance and regulatory pressures puts businesses with legacy systems at risk**
- **Power, cooling, and floor space limitations demand change**



- Increase storage utilization
 - Use more of existing and new assets
- Capacity purchase deferral
 - Reduce need to purchase capacity in step with business growth
- Capacity reclamation
 - Free up high-performance capacity for future use
- Extend useful life of existing assets
 - Reduce migration period to allow for extended use of systems
- Repurpose existing assets
 - Manage heterogeneous storage capacity as a single pool that inherits the benefits of parent array
- Take advantage of cost savings features, such as thin provisioning, virtualization and dynamic data mobility, with existing storage systems, not just new ones



REDUCE NEED, RECLAIM EXISTING CAPACITY AND DEFER PURCHASES

- Storage pooling and thin provisioning
- ✓ **Virtualization**
- Tiered storage and dynamic tiering
- Disk configuration optimization – RAID 5 and 6 vs. RAID 10; high vs. low density
- Storage reclamation: ZPR and write same
- Thin replication
- Copy-on-write
- Service catalogs and chargeback information
- Intelligent archiving (compression, deduplication and single instancing)

- **It is becoming increasingly necessary to apply economic and financial principles to IT**
 - Architectures, roadmaps, standards
 - Operational excellence
 - Consumption behaviors
- **Use TCO to measure and compare,**
- **ROI and ROA to cost-justify**
- **4 key principles of storage and IT economics**
 - **Price does not equal cost** – price is about 20% of TCO
 - **34 different types of cost** – where is your sensitivity?
 - There are **economically superior** IT architectures
 - **Econometrics** – you cannot improve what you cannot measure



Hitachi Data Systems **HITACHI**
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Hitachi Mapping Tool

Select the cost areas you would like to reduce on the left, and you will see the Hitachi solution that directly reduce those costs on the right. It's simple. It's Storage Economics.

- Hardware depreciation (lease); current
- Software purchase or depreciation
- Hardware Maintenance
- Software Maintenance
- Storage Management, Labor
- Backup and DR Labor
- Migration, Remastering
- Data mobility
- Power Consumption/Cooling
- Monitoring
- Data Center Floor space
- Provisioning Time
- Cost of waste
- Cost of copies
- Cost of duplicate data
- Cost of growth
- Cost of scheduled outage
- Unscheduled outage (machine related)
- Unscheduled outage (people & process related)
- Cost of disaster risk, business resumption
- Recovery time (RTO) Costs
- Data Loss
- Litigation, discovery risk
- Reduction of hazardous waste
- Cost of Performance
- Backup infrastructure
- Backup media
- Cost of risk with backup windows
- CIFS, NFS related infrastructure
- Local and remote data circuits
- Storage area networking
- Non-compliance risk (archive, data retention)
- Security, encryption
- Time and Effort in Procurement

Change Sensitivity / "Set the Bar" 38% High

High Impact Solutions	Moderate Impact Solutions
5 Options predicted	11 Options predicted
Active Archive	Virtualization
	Thin Provisioning
	De-duplication
VTL	Zero Page Reclaim
	Storage Consolidation
Unified Backup	Disaster Recovery
Outsourcing	Disk Based backup
	Storage Services Catalog
	Utility Services
	Managed Services
Public Cloud	Private, Hybrid Cloud

Email your results:

www.hds.com/calculators

<http://www.hds.com/go/cost-efficiency/mapping-tool/>



HDS HAS A PROVEN ECONOMIC FRAMEWORK TO ASSIST YOU RIGHT NOW

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- Years of experience, data points and proven techniques
 - Consultants available around the world to offer quick baseline workshops, often for free or a very low rate
 - Experience in all industry segments
- Tools for self-analysis or complex modeling
 - TCO, ROI, ROA
 - Mapping, prioritization
- Full engagements available for transformation services
- Many case studies, white papers, tutorials, formal training and certification and self-help materials are in the public domain
- **HDS thought leadership on this topic since 2002**
 - Thousands of engagements worldwide
 - Public domain content www.economizyourstorage.com
 - Join the economics blog dialog at <http://blogs.hds.com/david/>



PROJECT TCO SAVINGS THROUGH IMPLEMENTATION OF NEW ARCHITECTURES

**Current SAN and DAS islands are unsustainable
Technology refresh takes months**

Utilization of allocated space is 20-30%

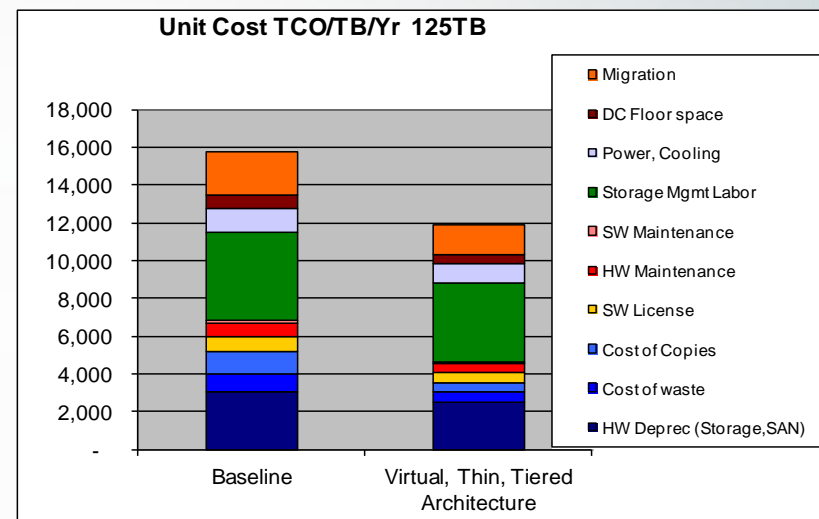
In order to drive down unit costs, new storage architectures have to be employed

- **HDS and an economic triumvirate**

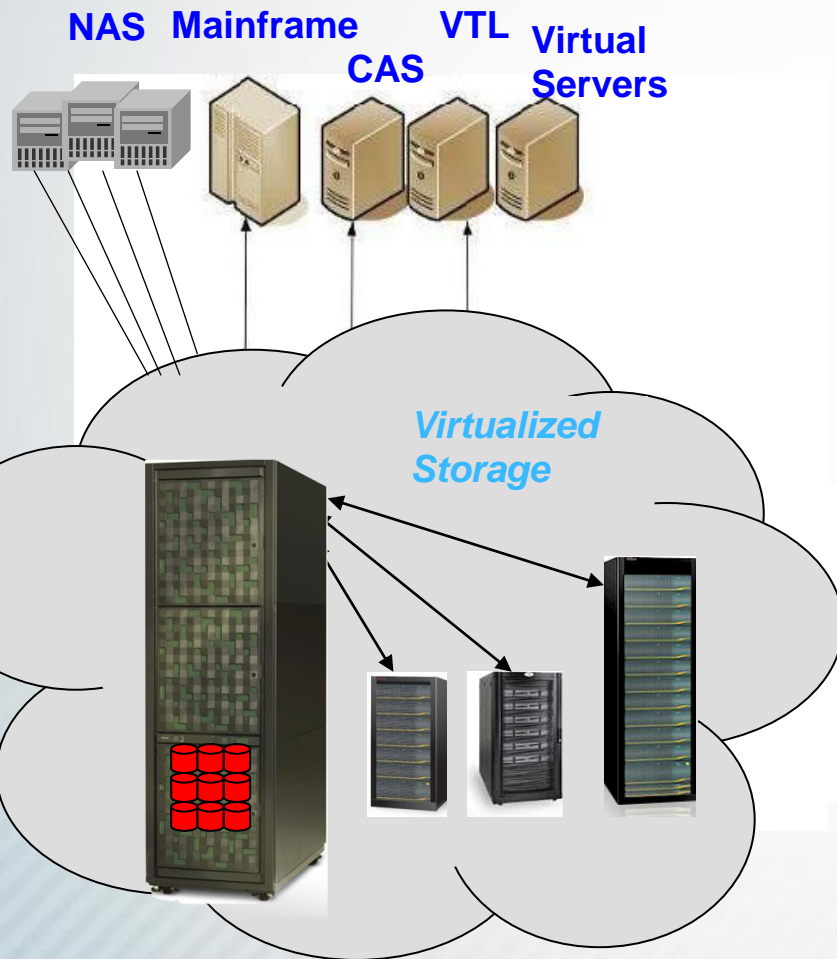
- **Storage virtualization** – in the controller
 - Reclaimed space, better aggregate utilization, better management
 - Significant time and cost savings with data/array-based migration
- **Dynamic tiering**
 - Data mobility within the tiers, policy-based
 - Move and tier the copies!
- **Dynamic provisioning** (thin provisioning)
 - Space reclamation, wide striping and very fast provisioning

- **Observed unit cost reduction of 25% in about 1 year with virtual, thin and tiered architectures**

- Flexible, on-demand capacities; pay-as-you-go virtual assets for the cloud



DETAILS OF COST SAVINGS FROM VIRTUALIZATION



Virtualization infrastructure impact

- Aggregates enterprise storage services for agile, scalable, service level-based delivery
- Reduces complexity, reclaims capacity, simplifies management, improves integrity and reliability and lowers operations costs
- Leverages existing investments, improves ROA
- Subordinate arrays inherit the qualities and capabilities of the host controller

Information storage impact

- Solves content problems, provides application and media independence

Virtualization outside the box

- Enables seamless integration of new and future capabilities
- Enables cloud storage, data migrations, lifecycle management, media migration and integration of data across applications

▪ Heterogeneous storage pools

- Single point of management
- Consolidation of software licenses and maintenance fees
- Subordinate arrays inherit control system features and functions
 - Thin provisioning, dynamic tiers, VAAI

▪ Extend the useful life of assets – **sweat the storage assets**

- Virtualized assets can be demoted as they age and kept in the virtual pool
- Maintenance contracts can become *creative* to meet SLA and overall costs
- Environmental costs will, over time, determine cost inefficiencies of older arrays in the pool

▪ Capacity reclamation

- 20-30% space reclamation is not uncommon with virtualization alone
- Coupled with thin provisioning, reclamation of 50% is very common
- With large consolidations and virtualization initiatives
 - Reclaimed capacity can be used for organic growth and CAPEX avoidance
 - Capacity consolidation reduces number of frames on the floor



- **Array migration, data migration**

- Migration costs tend to be \$7-15K per TB with monolithic architectures and can take several months to complete
- Virtualized storage migration is non-disruptive and can be completed in a few weekends at a fraction of the previous cost

- **Advanced storage functionality**

- SAN and NAS converged
- Multi-tenancy
- Chargeback, metering, policy-based management

- **Virtualization can enable new storage architecture capabilities**

- Dynamic tiers, and flexibility with data types (structured, unstructured, rich media, file, block, etc.)
- Virtual volumes and capacity on demand
- Content depot to share a common storage infrastructure
- Cloud services that include multitenancy, metering and billing
- Scale up, out and deep
- VM impact for scaling, performance and overall costs





Enterprise Data Center Applications

Tiered storage and virtualization via enterprise hardware platforms
Common protection solutions
Common storage management



Content Depots (Archiving, Object and Content Level Awareness, Web 2.0)

Foundation for open, scalable and integrated content solutions



COMMON INTEGRATED STRATEGY

For management, security, data protection and search



Distributed Enterprise and Departmental Applications

Midrange hardware platforms
Common storage management
Common protection solutions



File Storage – Two Key Segments

High-performance NAS: Focused on high-throughput environments
Standard NAS: Focused on file sharing and backup environments



- Lower CAPEX
 - Reclaimed capacity
 - Longer asset usefulness
 - Lower cost of growth with overall utilization improvements
- Cost of migration
 - Labor, tools, outage, ROA
 - Migrations tend to be 10-20% of the cost and overall time required with virtualization
- Cost of SW licenses
 - Common pool, one source for control, replication
- Software maintenance costs
- Hardware maintenance costs
 - Support rates commensurate with the tier of data
 - Older assets can be demoted to lower tiers, different maintenance rates
- Management, labor



STORAGE VIRTUALIZATION LEADER

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External Storage Virtualization Leader

- >19,000 virtualization controllers shipped
- >40% of customers actively use external storage virtualization
- Best infrastructure migration solution in the world

Storage Virtualization Management Leader

- 2010 Hitachi Dynamic Provisioning penetration rate >50%
- >500PB storage under management, 50% virtualized
- One enterprise platform for all data



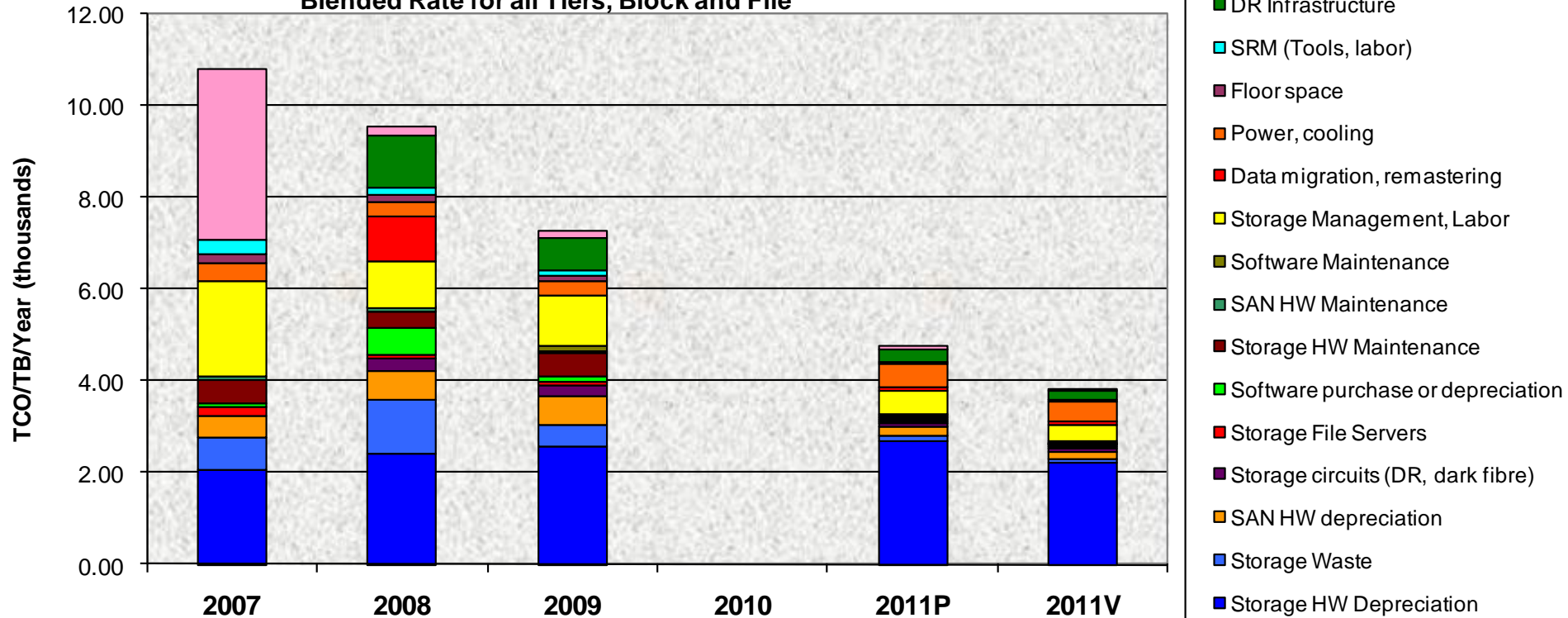
COST SAVINGS CASE STUDIES

CASE STUDY: FOCUS ON UNIT COSTS



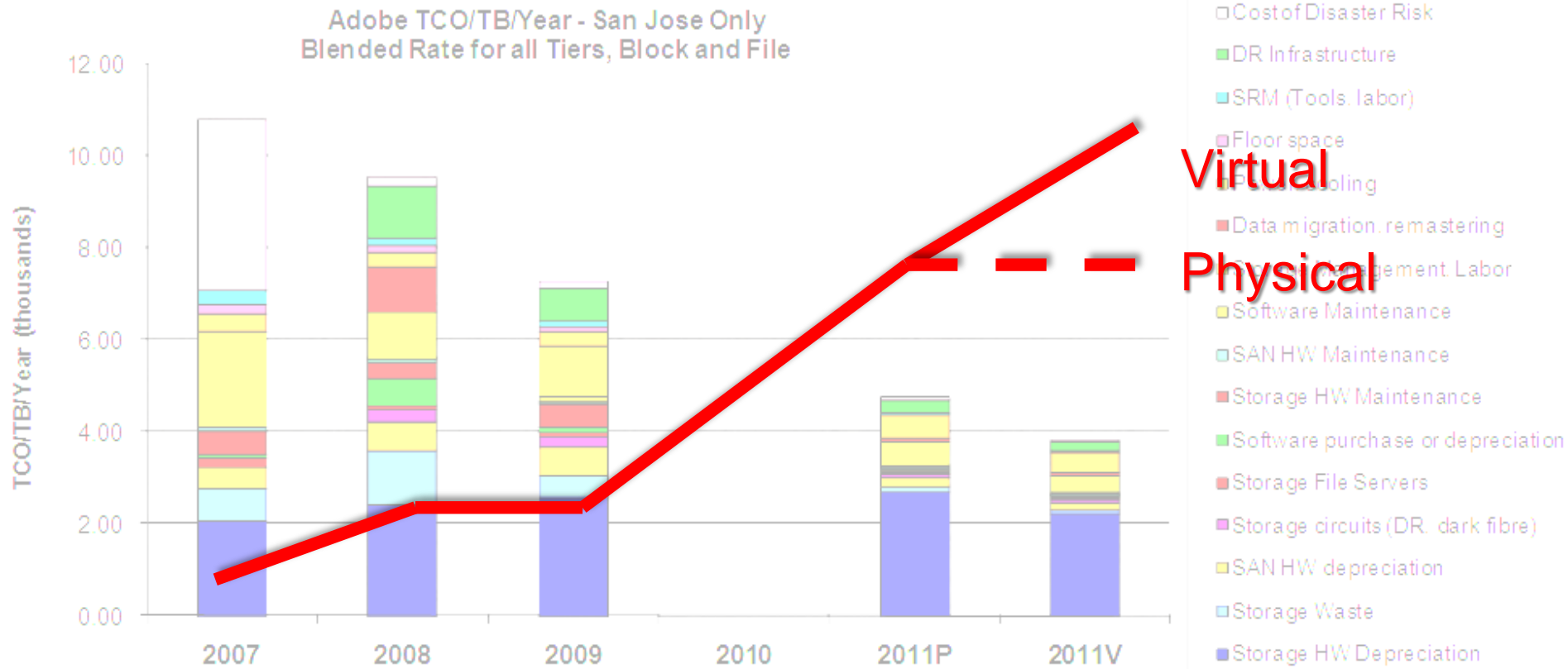
Adobe

Adobe TCO/TB/Year - San Jose Only
Blended Rate for all Tiers, Block and File



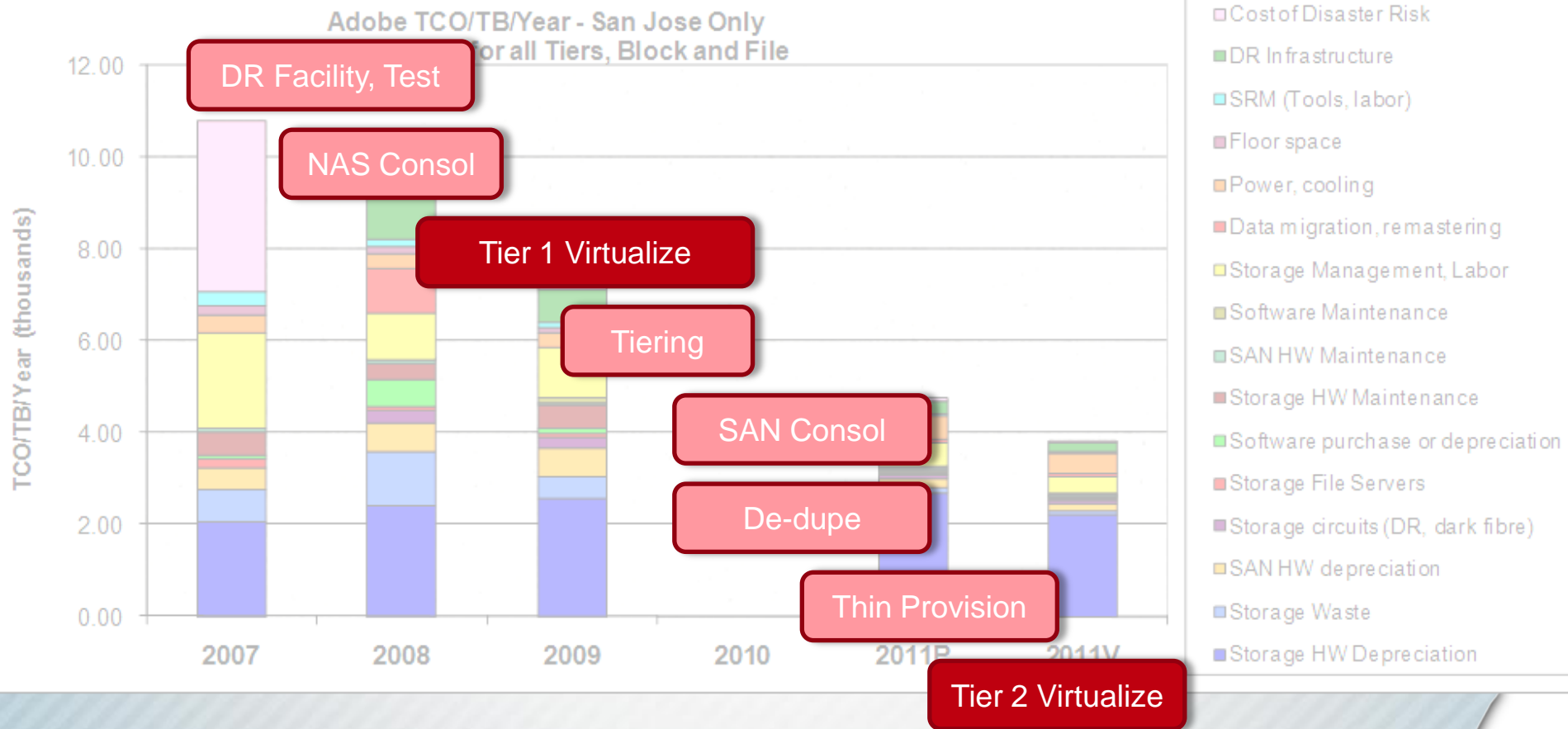
UNIT COST REDUCTION WITH 40-65% CAGR

- Adobe growth from 220TB to 1.6PB



KEY INVESTMENTS TO REDUCE UNIT COSTS

- Structured, funded investment plan



Listen to the WebTech about Adobe's multi-year journey of storage cost reduction, "A Foundation for Economically Superior Storage Architectures" at www.hds.com/webtech





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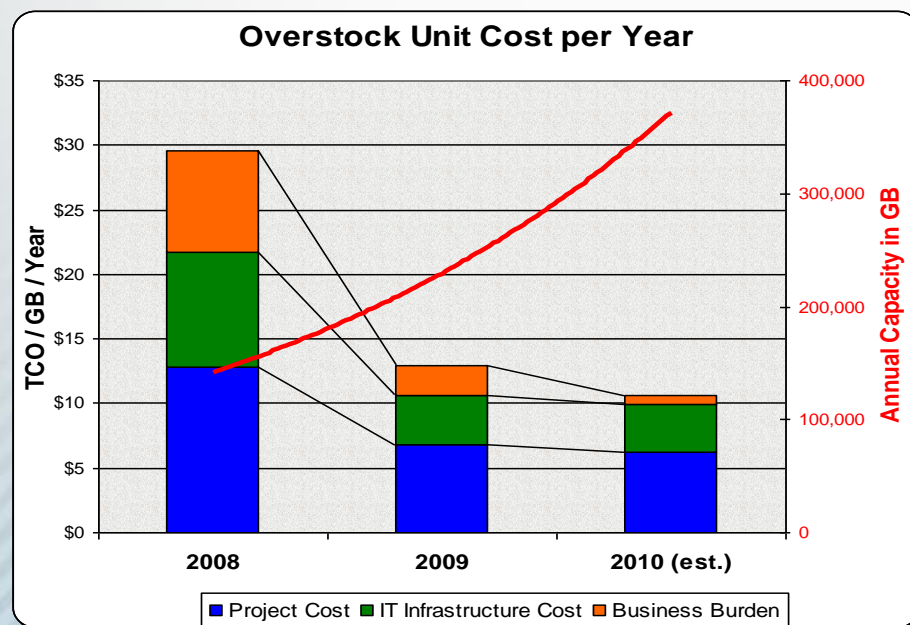
“With Hitachi virtualization technologies, we've seen storage capacity savings of 50% on some arrays, now provision storage in 25% of the time, and have increased utilization rates by over 30%. Overall, we've reduced our capital and operating costs for an improved return on our storage investment.”

– Carter Lee
Vice President of IT Operations, Overstock.com



STORAGE VIRTUALIZATION ECONOMICS: OVERSTOCK.COM

Element	Before	After
Number of storage arrays	8	4
Usable capacity in TB	133	236
Tiers, RAID	Tier 1 (75%) RAID 10 Tier 2 RAID 5 Software tiering	Tier 1 5% RAID 10 Tier 2 55% RAID 5 Tier 3 40% RAID 6
Management	3 people, planning to hire 4th	3 people
Migration	Very disruptive, time-consuming and complicated	Done in 30 minutes
Provisioning time	2-3 hours per incident	30 minutes per incident
Volumes	Thick	Thin, ZPR in the future



IT IS CHEAPER FOR YOU TO VIRTUALIZE AND RECLAIM THAN PURCHASE THAT CAPACITY

- Investing in storage virtualization through VSP adds another dimension to storage efficiency by extending these new capabilities to existing storage systems
- If your current storage system does not provide thin provisioning, which can reclaim 20-40% or more of allocated but unused capacity, you don't need to rip and replace it
- Just by attaching it behind VSP, VSP can see your existing LUNs and move them into a dynamic provisioning pool where the unused pages in the LUN can be reclaimed while your application is running



QUESTIONS AND DISCUSSION

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