# Erie Insurance Experience
# Using HDS Virtualization and Replication to Deliver Cost-Effective D/R Services

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# Agenda

- Introduction
- Virtualization value proposition
- Options and vendor selection
- Solution overview
- Project schedule and implementation experiences
- Results
- Lessons Learned


# Company Overview

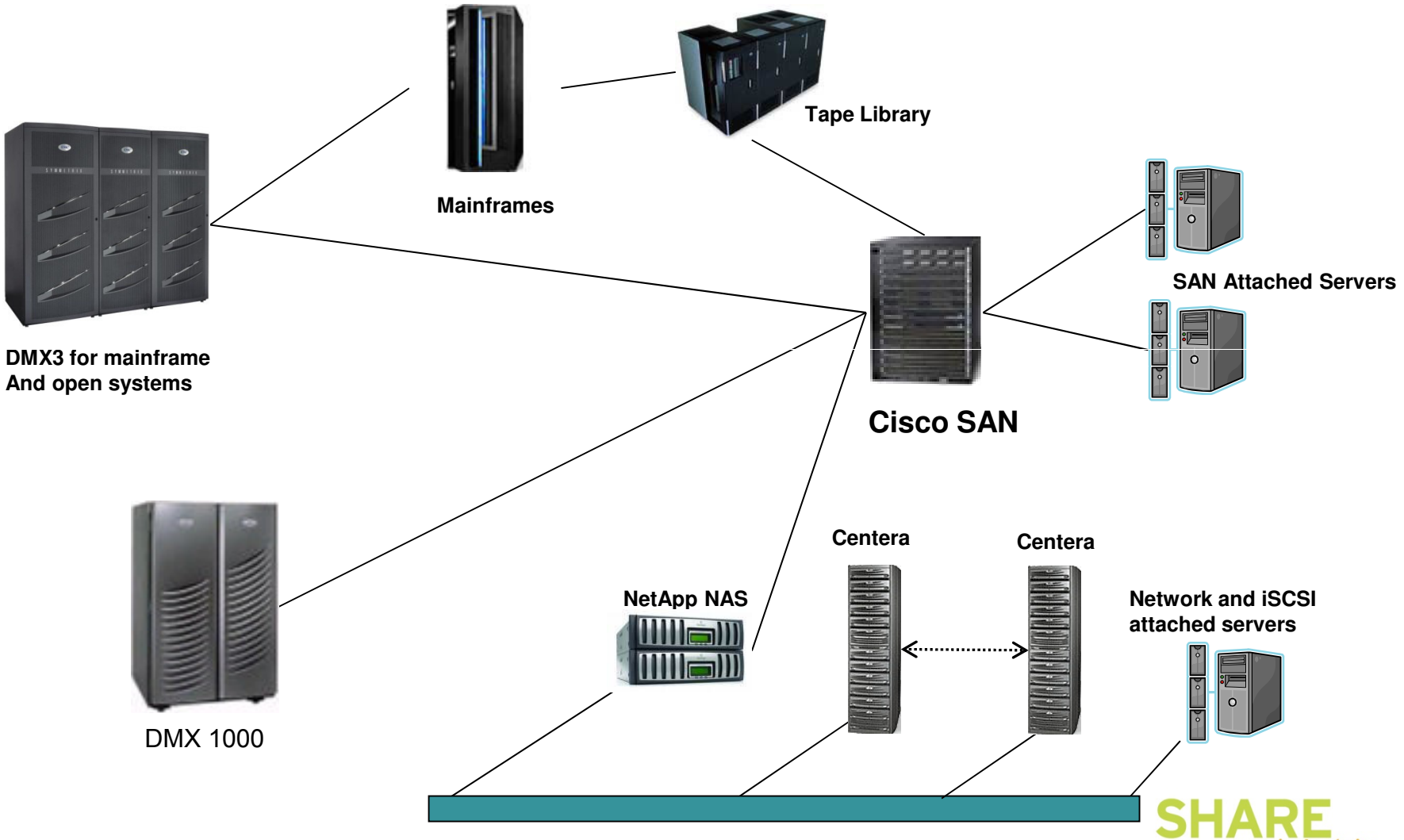

- Public company (NASDAQ: ERIE)
- Roots as auto insurer in Pennsylvania since 1925
- Now providing auto, home, business and life insurance through a network of 2000+ independent agencies
- Servicing 11 states and District of Columbia
- More than 4200 employees at home office and 23 field offices
- Over $1.1 billion in operating revenue (2009)

# Today's IT reality - Erie is no exception!

- **Data!**
  - **Data Tsunami Continues…**
  - **Data Migration, Data Consolidation are Disruptive Processes**
  - **Data Scattered across data centers and remote locations**
  - **Data Protection is at a break point**

- **Vendors!**
  - **Lock-in is their goal**
  - **Heterogeneous Storage is a Reality in real world today**
- **Compliance!**
  - **Stringent Compliance And Regulatory Environment**
- **Staff!**
  - **Can't add IT staff indiscriminately to keep up with capacity growth**

# Storage Environment Before Virtualization



# Attributes of the *"before"* environment

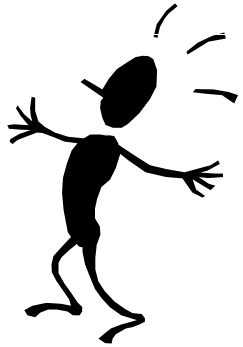
- Storage Tiers 2-4 in same box as Tier-1
- Different management systems for various storage solutions
- D/R is traditional outsourced 'hot-site' physical tape-based recovery for both mainframe and open systems

- Installed storage vendor profile
  - EMC *Incumbent for SAN and mainframe*
  - Net App *Incumbent for NAS*

# Drivers for Virtualization


- **New Applications/Storage Needs** – High disk storage capacity anticipated
  - Data Warehouse
  - Content Management
  - New Policy Administration
  - VMware – as more servers are virtualized disk needs will continue to grow

- **Current Costs Too high**
  - Mostly tier-1 storage
  - One vendor SAN – Different Vendor NAS
  - High migrations costs (both $$$ and time)
  - Very low storage utilization rates (<40%)
  - Very expensive to replicate “AS IS” environment



- **Application Scheduled Outages Too Frequent**
  - Disruptive data migration
  - Outages required for adding storage to applications
  - Changes require staff to work weekends

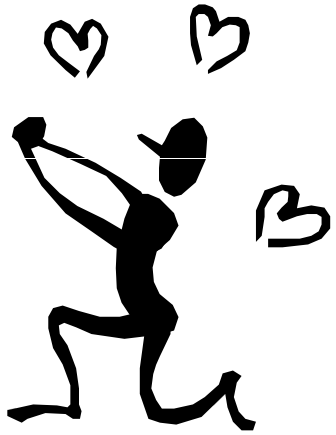
- **D/R Replication Needed**
  - Virtualized disk simplifies the replication.

# Specific Challenges for D/R

- Couldn't meet RTO < 24 hours
  - Need to reduce RTO and RPO
- Eliminate physical tape from backup/recovery processes
- Six month project implementation timeline needed

# Virtualization Value Proposition

- **Operational Benefits**
  - **Consistent Interface** for all storage applications
  - **Eliminate Server Downtime** needed to perform traditional storage management (add/change/delete/reconfigure LUNs)
  - **Non-disruptive**
    - Data consolidation
    - Data migration
    - RAID level changes
  - **Seamless**
    - Heterogeneous tiered storage
    - Replication across heterogeneous storage
    - Backup/restore, archival, thin provisioning, etc.
  - **Manage Space - Not Drives**
  - **Quicker Recovery (RTO)** through preparation and automation



- **D/R Benefits**
  - **Faster**
  - **Underlying hardware does not have to match**

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# What the analysts were saying…

- **Gartner**
  - **"The Next Big Thing in high-end enterprise storage arrays is array virtualization and partitioning**, *which will enable matching of application requirements to storage resources. This will improve security for individual applications and enhance functionality."*
  - **The Role of Enterprise Storage is Changing.** *"Disk array partitioning and virtualization will change the role of the disk storage control unit. It will bring significant operational benefits to data centers, such as enabling matching of application requirements to storage resources and improving security for individual applications."*

- **Forrester**
  - **"IBM** has supported the DS series…it often looks and feels more like an Erector set to be built onsite than an integrated suite."
  - "**HDS** (Hitachi Data Systems) has developed an extensive software offering around the Universal Storage Platform (USP) …USP's extended functions supporting disaster recovery and secure storage for compliance should help HDS grow market share"
  - "**EMC**... a surprising laggard in virtualization."

# High-level Options

- Virtualize open systems only
  - Use disk replication for mainframe only
  - Use *only* replicated VTL for open systems
- Virtualize open systems and mainframe
  - Use disk replication for mainframe and most open systems SAN data
  - Use replicated VTL for some non-SAN open systems data and/or lower-tier open systems data

# Players – Leading Vendors

- EMC
- IBM
- Hitachi Data Systems
- NetApp
- FalconStor

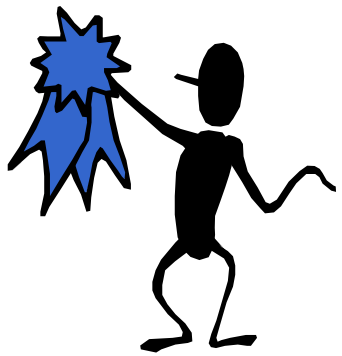
# General vendor implementation issues to consider and WATCH!!!

- Some virtualization vendor solutions require additional software loaded on servers
- Additional maintenance and configuration can offset benefits
- Virtualization blurs the lines between who owns what
- Knowledge transfer from vendor
- Data protection (e.g., encryption) may degrade virtualization benefits (e.g., de-duplication)
- Initial implementation may require system downtime
- Be careful when selecting data to go to tier 2 or lower. Just because it's a test application it may still need high performance.

# Selected Hitachi Data Systems!

## Why HDS?

- Mainframe Storage Virtualization
  - No support from FalconStor* & NetApp
  - EMC too complex with multiple layers
- Implementation
  - Fast
  - Straight forward



**Great solution for < 200 TB w/o mainframes*

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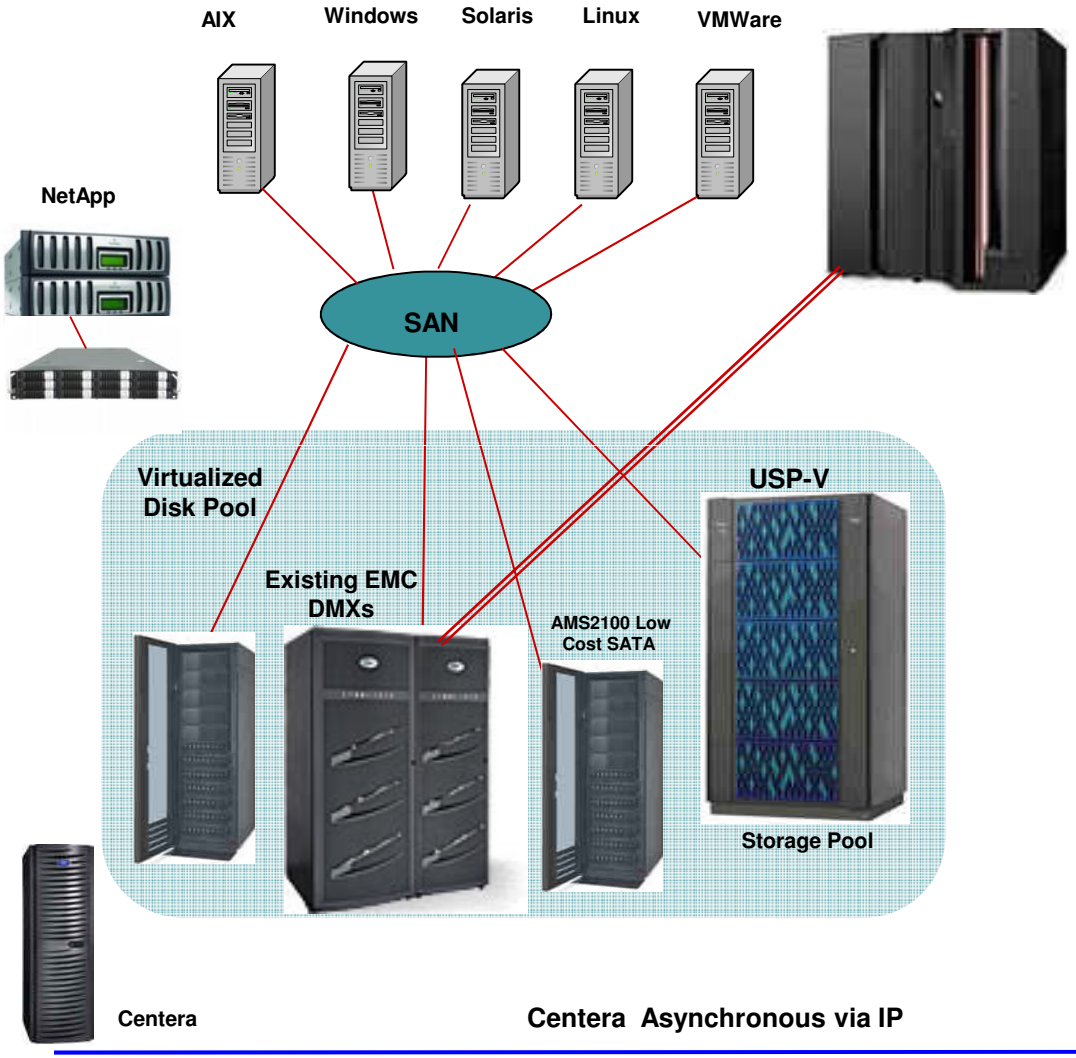
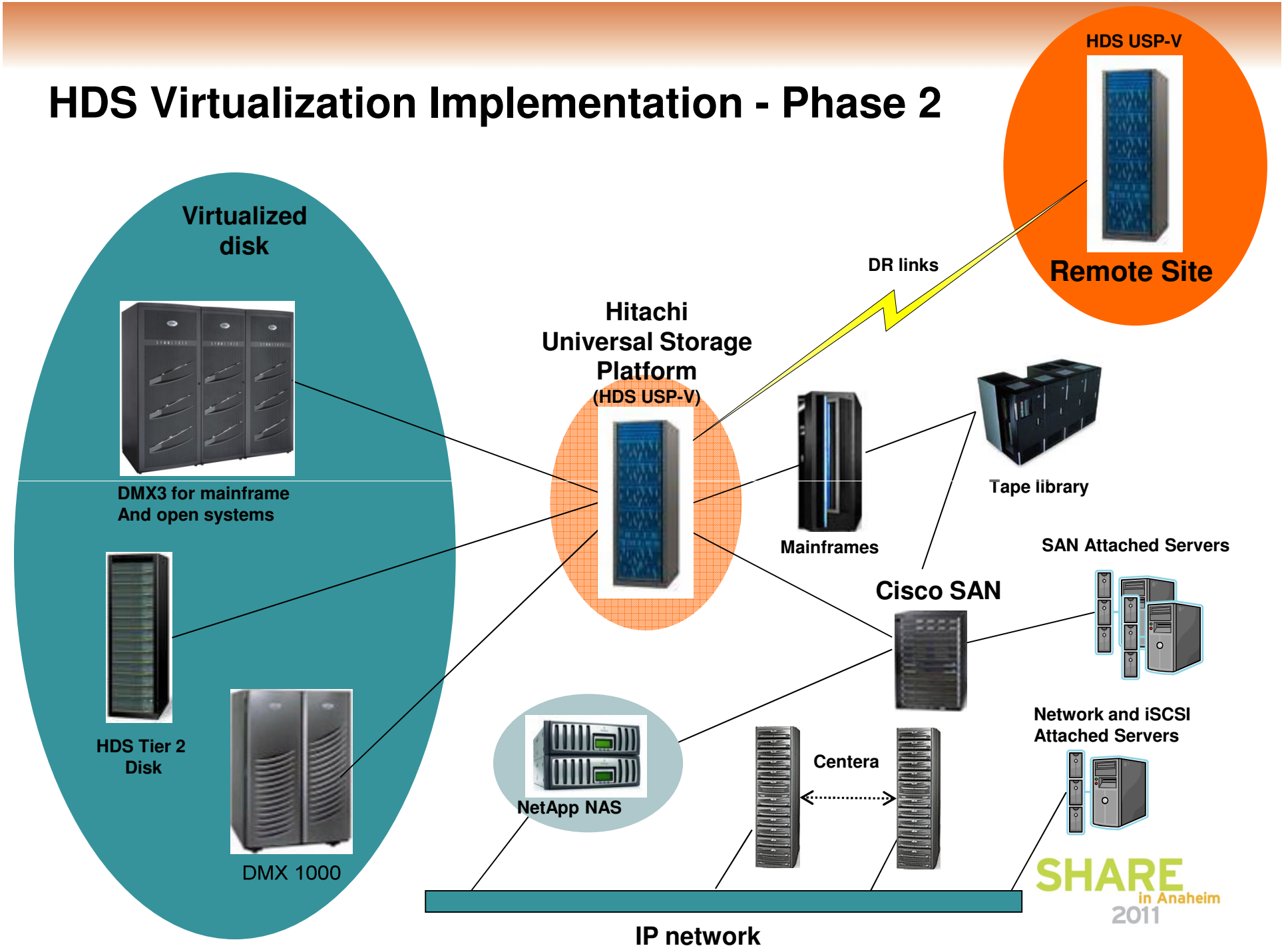
# HDS Virtualization Implementation - Phase 1



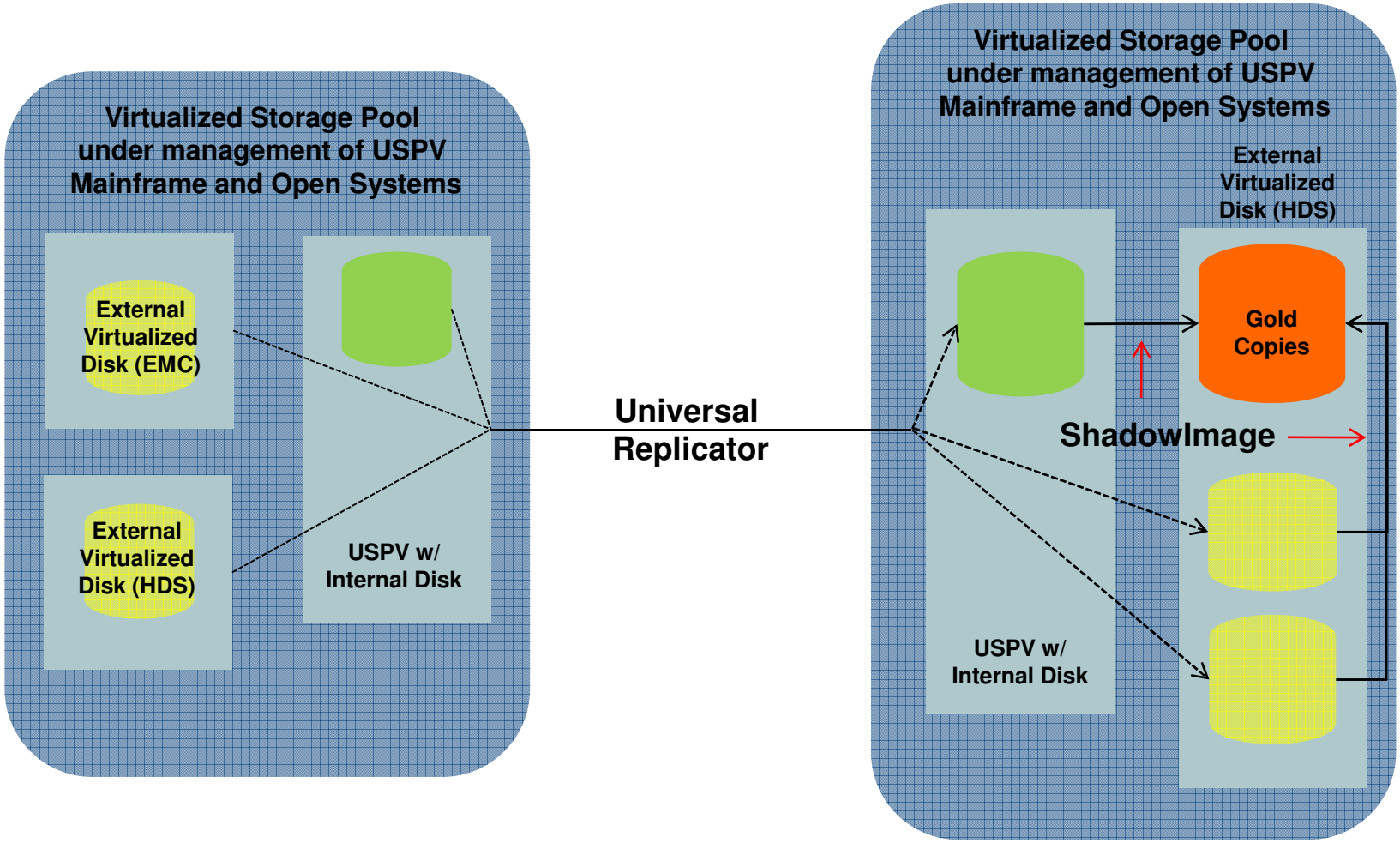

## Solution

- Virtualized open systems storage
  - Initially kept mainframe as direct connect to EMC DMX
  - Added HDS AMS for lower tier disk
  - Used HDS Tiered Storage Manager to create tiers of storage and migrate non-disruptively
  - No host outage required to migrate data and/or EOL hardware
  - Used Thin Provisioning to address low utilization rates
  - Single management systems for all storage virtualized behind USP-V

# HDS Virtualization Implementation - Phase 2



# HDS Virtualized Replication Solution



# Solution “End State”


- Migrated mainframe storage internal to HDS USPV
- Redeployed mainframe storage as open systems virtualized storage
- Implemented Hitachi Universal Replicator for both mainframe and open systems array-based replication
  - Includes replication of mainframe s/w-based virtual tape
- Used Hitachi ShadowImage to create “gold copies” to run D/R tests in parallel with production replication
- HDS replication used to speed recovery of NetBackup backup/recovery in the D/R site
- Use replicated Data Domain VTL to recover some open systems internal disk data  (server O/S, etc.)

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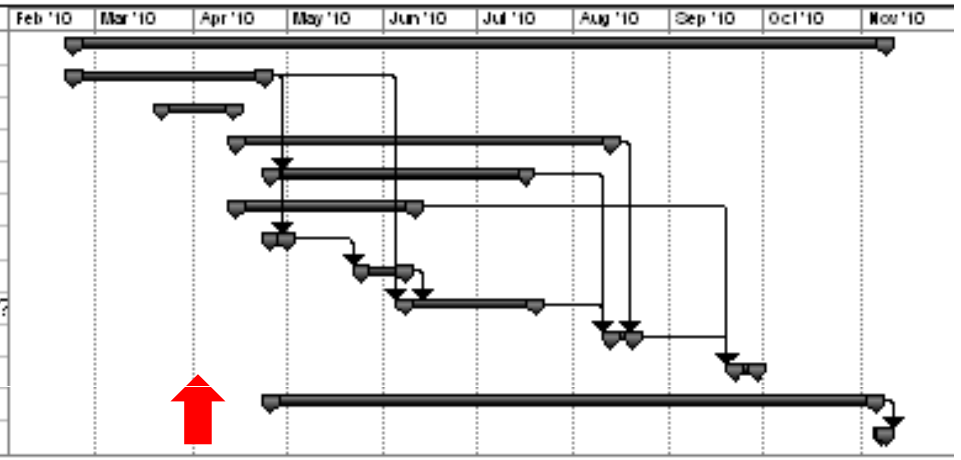
# High-level schedule for Phase II (D/R)

| ID | Task Name |
|---|---|
| 1 | Erie Replication Services |
| 2 | Open Systems Remote Copy Planning & Design - 30 Servers |
| 11 | Mainframe Remote Copy Planning & Design |
| 18 | Implement Replication Infrastructure |
| 22 | Open Systems Replication Implementation via Resident |
| 30 | Open Systems HDP 'Clean-up' (via Resident) |
| 36 | Mainframe Data Migration Planning & Design 40 TB on DMX |
| 41 | Mainframe Data Migration - DMX |
| 48 | Mainframe Replication Implementation - Up to 40 TB (%CopyCross? |
| 54 | DR Stand Up |
| 58 | Disaster Recovery Test |
| 60 | Resident |
| 62 | Project close |




**Decision to purchase/implement actually happened here!**

- Key schedule and transition approach:
  - The hardware and software for the disaster recovery improvement project was initially implemented on-site at the Erie complex, installed, configured and tested prior to being moved to the recovery site in Philadelphia.
  - This activity occurred during the 4-month window needed to get the replication bandwidth ordered/installed. (#18).

# Major Tasks Accomplished

- Virtualized the existing storage for the mainframe and SAN (storage area network)
- Migrated mainframe data from EMC storage to Hitachi USPV internal storage
- Implemented data replication for the mainframe and SAN
- Implemented data replication for the Network Appliance (network attached storage)
- Installed and configured a VTL (virtual tape library) for distributed systems including replication

# Major Tasks Accomplished (cont'd)

- Installed and configured an Advanced Recovery Cabinet to be placed at our recovery site with the following Erie owned and managed components to expedite the recovery process:
  - Distributed systems NetBackup master server pre-configured
  - Firewall, SAN switches, I/P switches
  - ACE 4710 (application control engine)
  - ASA 5505 (adaptive security appliance)
  - Layer 7 XML gateway, Active Directory, VMWare ESX server
- Contracted with our current D/R provider (SunGard) for two OC12 circuits to support the data replication solution between the two sites.

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# Results realized

- Physical to logical connections to storage… works great!
- Mainframe performance and batch throughput increased significantly moving from EMC-DMX to HDS-USPV
- Open systems thin-provisioning reclaimed about 25% of unused storage (allocated but not used)
- Purchase costs have gone down for disk drives
- Freedom of choice for hardware purchases
  - Leveraged investment in existing EMC storage
- Storage management
  - One storage management system!
  - Much easier administration
  - Migrations are a breeze with no availability impact
  - Easy to add and reconfigure Disk Drives

# D/R Test – Realized Results

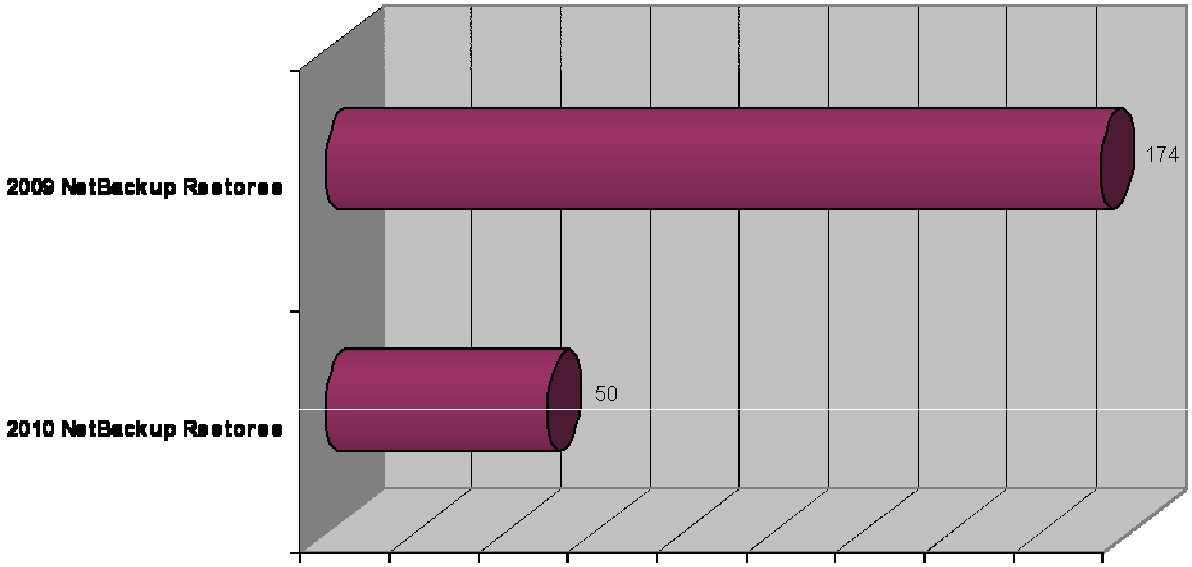
| Recovery Time Objective (RTO) | |
|---|---|
| 2009 Mainframe Recovery Time | 25 Hours |
| **2010 Mainframe Recovery Time** | **4 Hours** |
| | |
| 2009 NetBackup Recovery Time | 13 Hours |
| **2010 NetBackup Recovery Time** | **1 hour** |

| Recovery Point Objective (RPO) | |
|---|---|
| 2009 Recovery Point Minimum | 12 Hours |
| **2010 Recovery Point Minimum** | **<1 hour** |
| | |
| 2009 Recovery Point Maximum | 36 Hours |
| **2010 Recovery Point Maximum** | **4 Hours** |

| Distributed Systems Recovery | |
|---|---|
| 2009 Recovery | 33 Servers |
| **2009 Failures** | **5 Servers** |
| | |
| 2010 Recovery | 56 Servers |
| **2010 Failures** | **0 Servers** |

- Successfully recovered all 47 Tier-1 and Tier-2 applications
- Reduction in RTO and RPO of around 90%
- No physical tapes used for the recovery
- Delivered the project on schedule

# Reduced number of restores




Data recovered directly from replicated “Gold Copy” versus NetBackup tape restores included:

- Virtual servers replicated on the SAN (Storage Area Network)
- Oracle databases
- Microsoft SQL Server databases
- Network Attached Storage (NAS)

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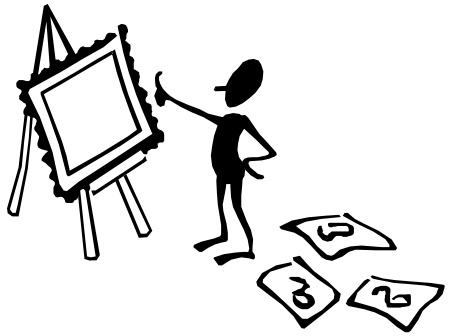
# Vendor Lessons Learned

- **HDS Licensing Model**
  - Costs continue to rise (prices per GB of virtualized storage)
  - However, costs still less than non-virtualized
  - Net/Net - Lower TCO (including 25% 'storage reclaim')

- **We didn't know what we didn't know**
  - Professional Services SOW didn't contain all we needed
  - Our staff needed additional training
  - Status: Resolved



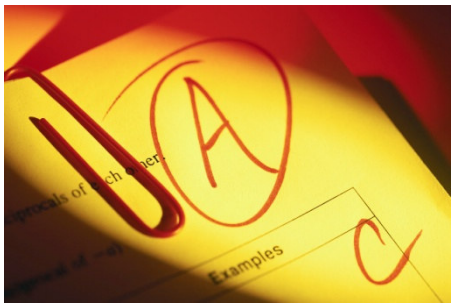
- **Overall Satisfaction - 9/10 - trending up**

# D/R Test - Gold Copy Lessons

- Background
  - “Gold Copy” was needed and enabled Erie to test against this copy of the data without risk to the replicated source data.
  - Also provides a 24 hour point in time backup that we could recover to in the event that the replication was corrupted.
- Lessons Learned
  - Provisioning “Gold Copy” LUNs to D/R servers provided by SunGard – Needed to provision in small groups
  - “Gold Copies” of the replicated data have unique names different from the original and the logical unit numbers (LUNS) are also unique.
  - Required extensive documentation to provision the correct data to the correct recovery infrastructure.
  - All of the disaster recovery processes and procedures used in past DR exercises needed to be re-written to utilize the new gold copy data.

# D/R Test – General Lessons Learned

- Get any temporary license keys you need at the outset of the D/R process
- Adjust configurations and/or automation to **not** look for things you plan **not** have during D/R (e.g., redundant components)
- Include the time-server (if you have one) in the D/R scope
- Make sure desktop PCs you're using to test applications have the latest images (otherwise they might connect to the Internet, request/download updates, etc.)
- Make sure desktop PCs using to do application tests have all the applications on them
- Validate/stress-test your VPN connections into the recovery site independent-of and prior to the D/R test



# THANK YOU!