Determining Your OpenVMS Environment Requirements for Business Continuity

Case study: Commerzbank AG

Daniel S. Klein
Marketing Program Manger
OpenVMS

Al Pillarelli
OpenVMS Engineering Downstream Services
Business Critical Programs & Technology

Werner Boensch
Executive Vice President and General Manager Commerzbank AG
North America

Gene Batan
Vice President and Systems & Information Technology Manager
Commerzbank AG North America

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"for every complex problem there is an answer that is clear, simple... ...

... and wrong."

H. L. Mencken

Internet computing outages…

Agenda

1. Decision-making Model
   Dan Klein
2. OpenVMS Disaster Tolerance
   Al Pillarelli
3. Case Study: Commerzbank AG North America 9/11/01
   Werner Boensch
   Gene Batan

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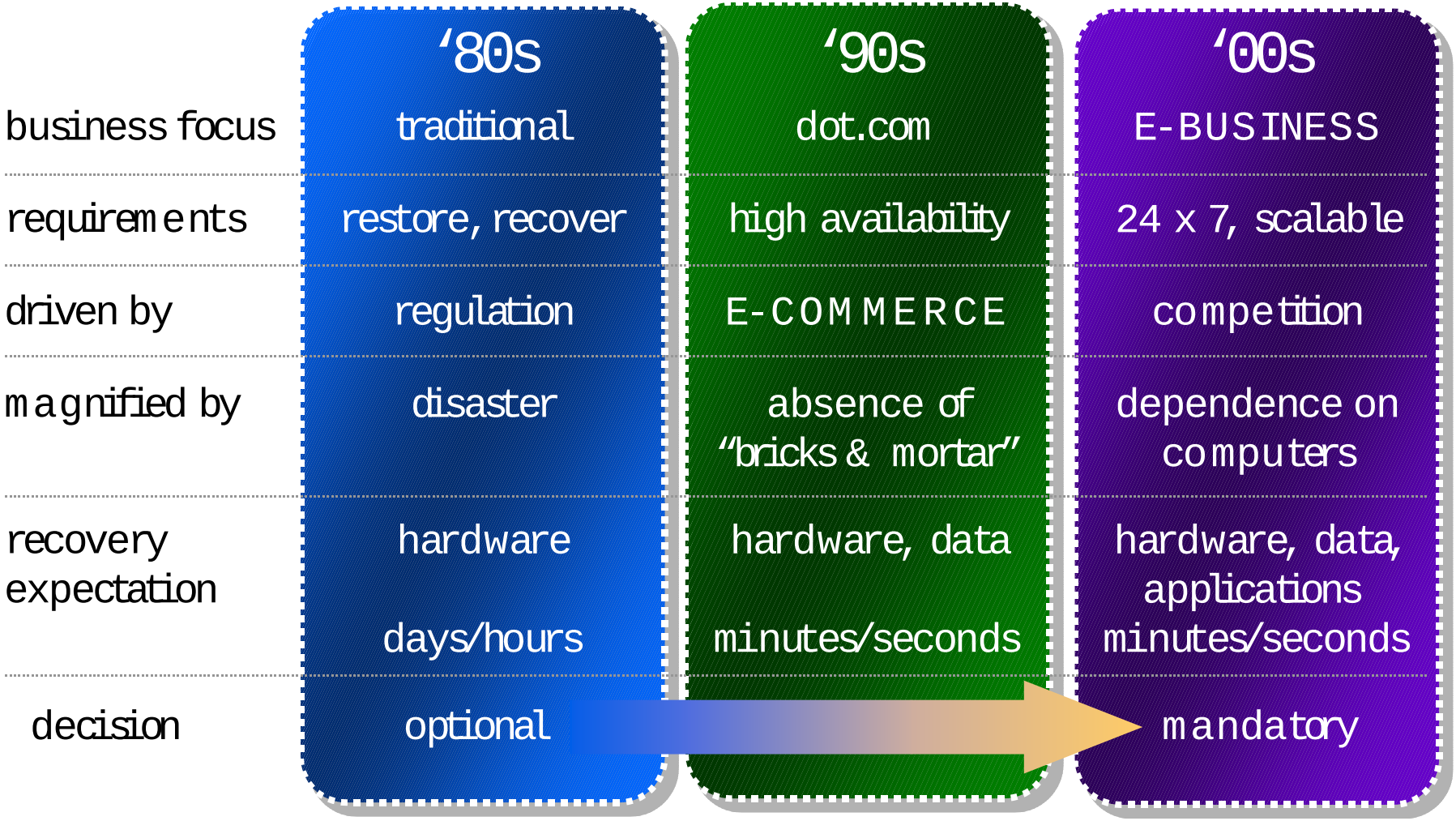
Decision-making Model

trends

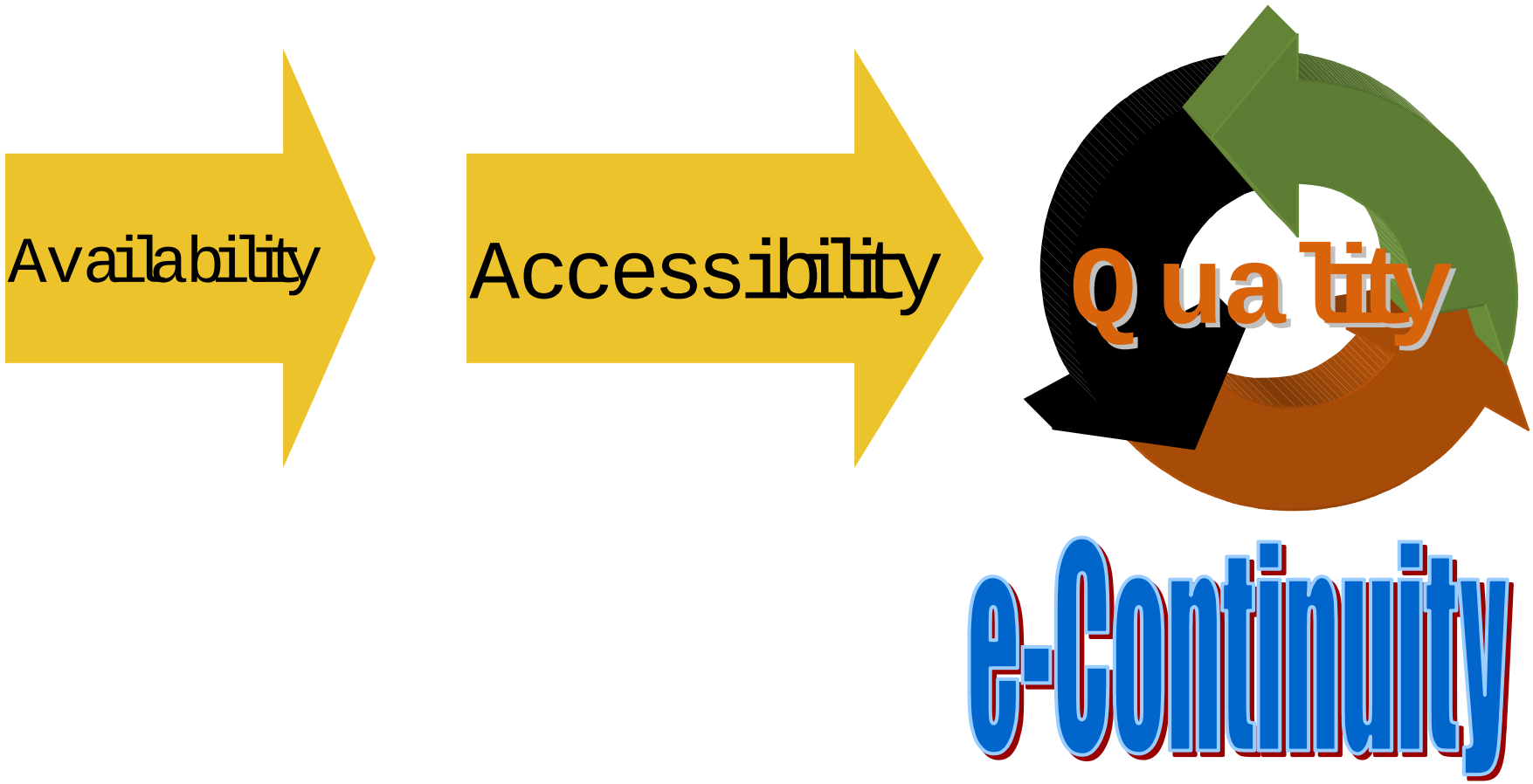
drivers

approach

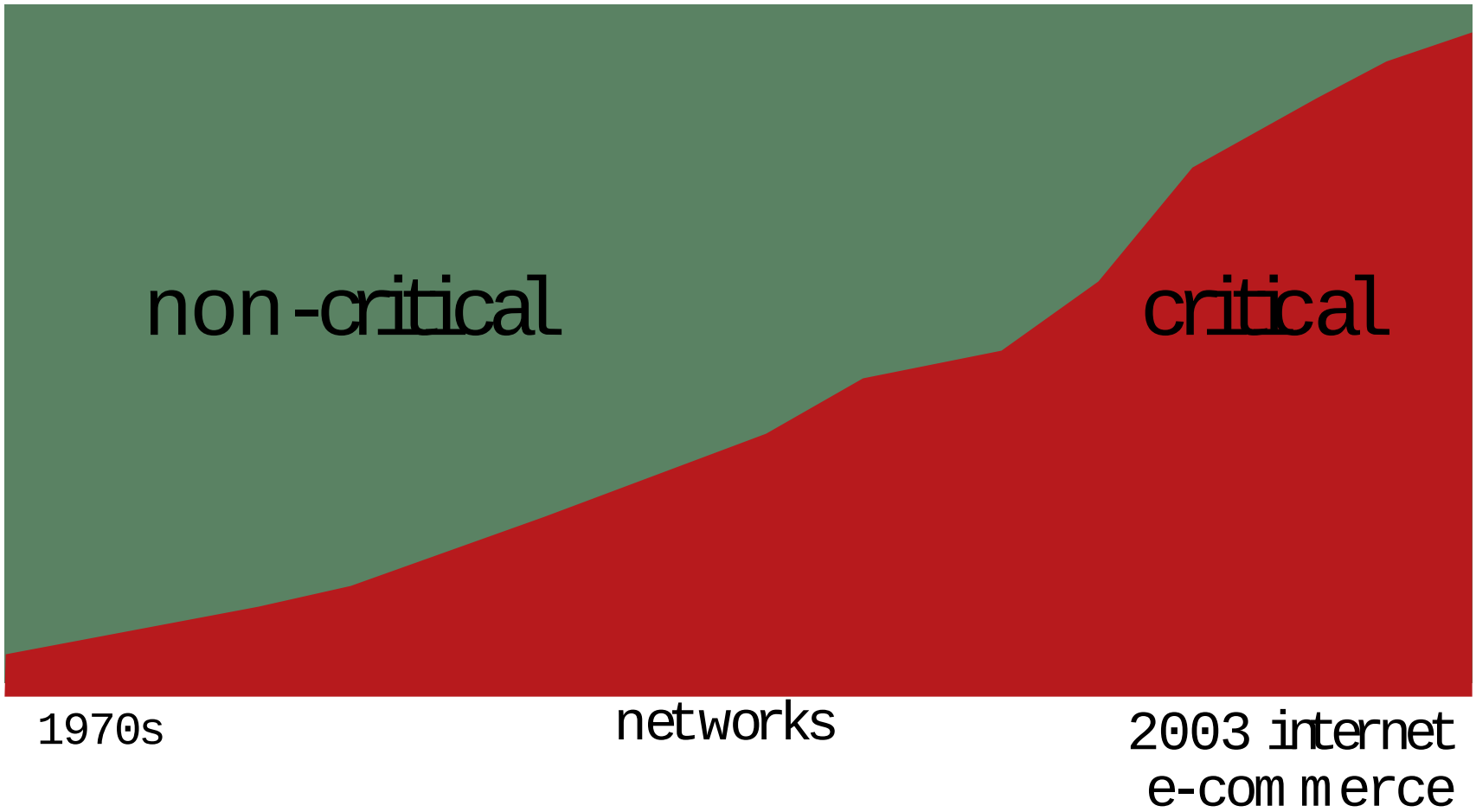
Evolution OF Business Continuity



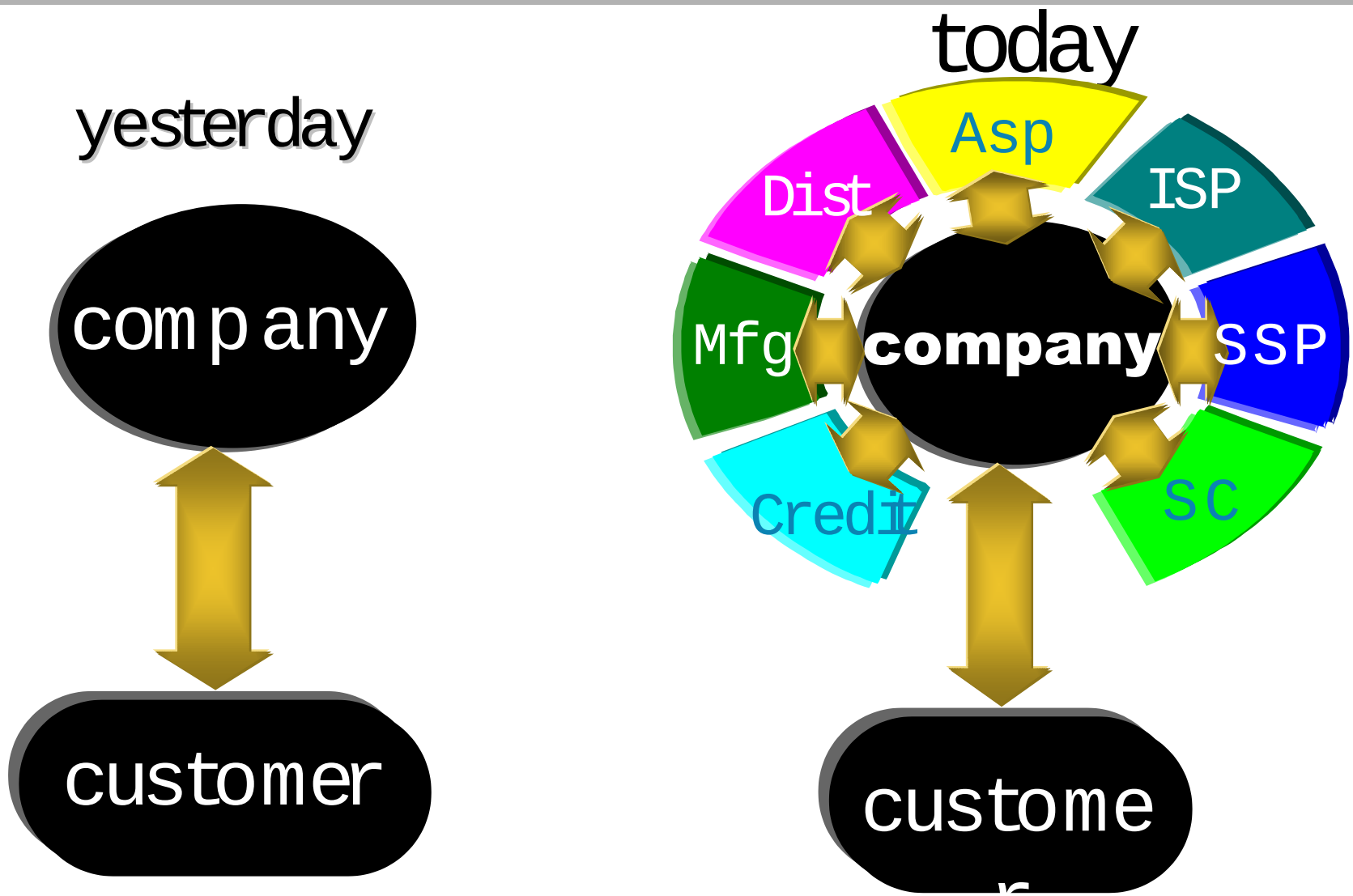
Changing Concept of Business Continuity



1st Driver: More Critical Applications



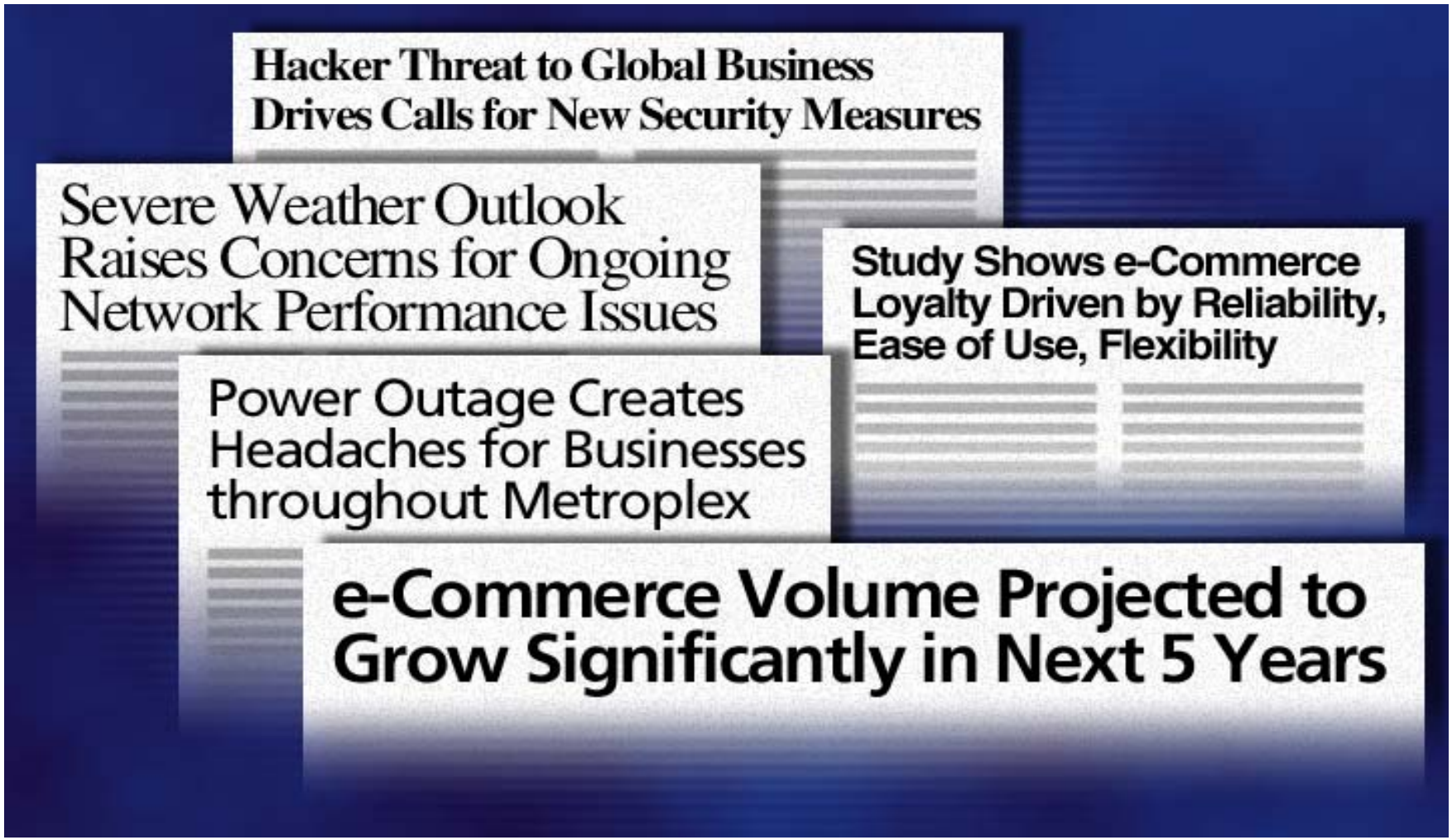
2nd Driver: Decentralization



For Example

www.bagelbuddies.com

3rd Driver: Round-the-clock Reliability



The Bottom Line

"Be online,

all the time,

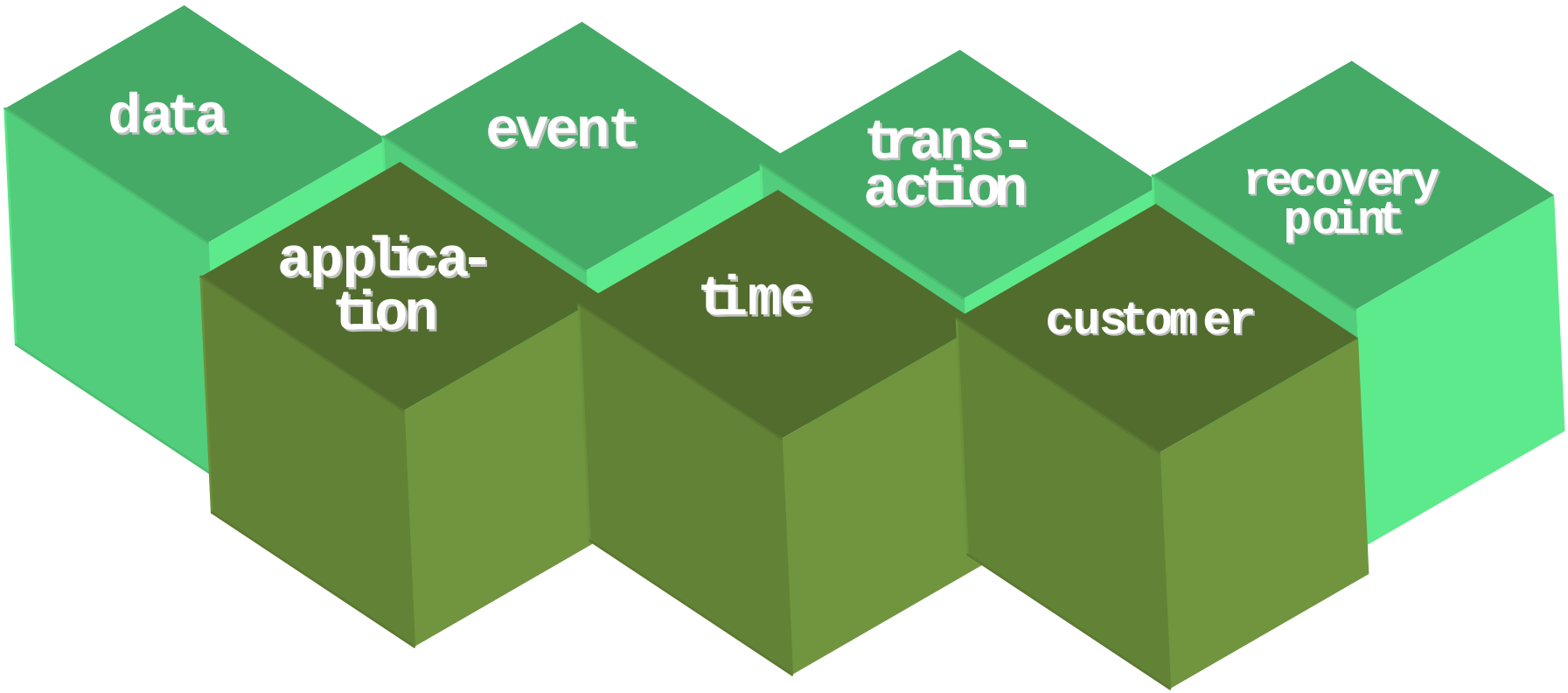
and

everywhere."

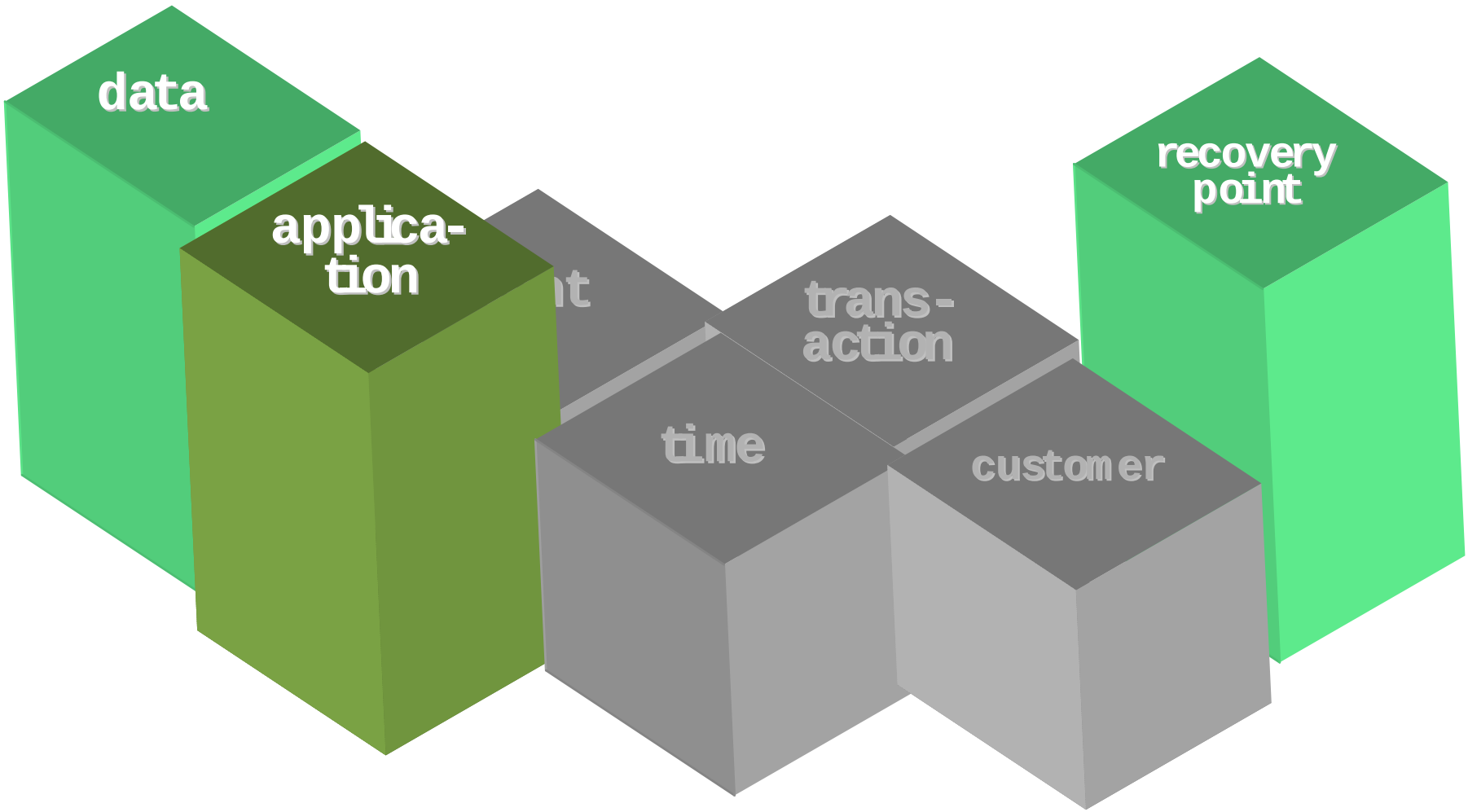
IDC, Feb, 2000

Paradox

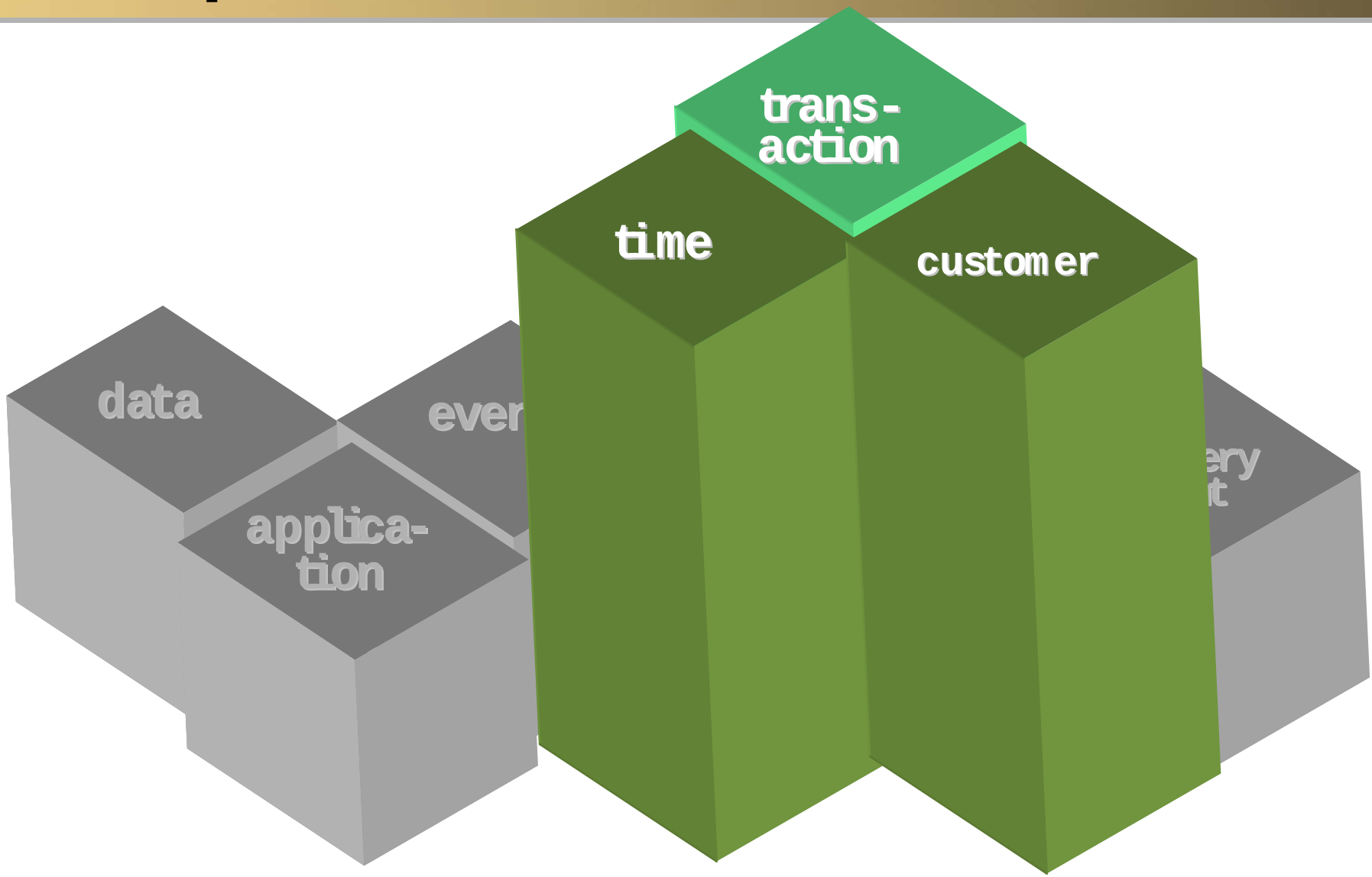
#1 Determine Operational Characteristics in the Context of Your Business Model



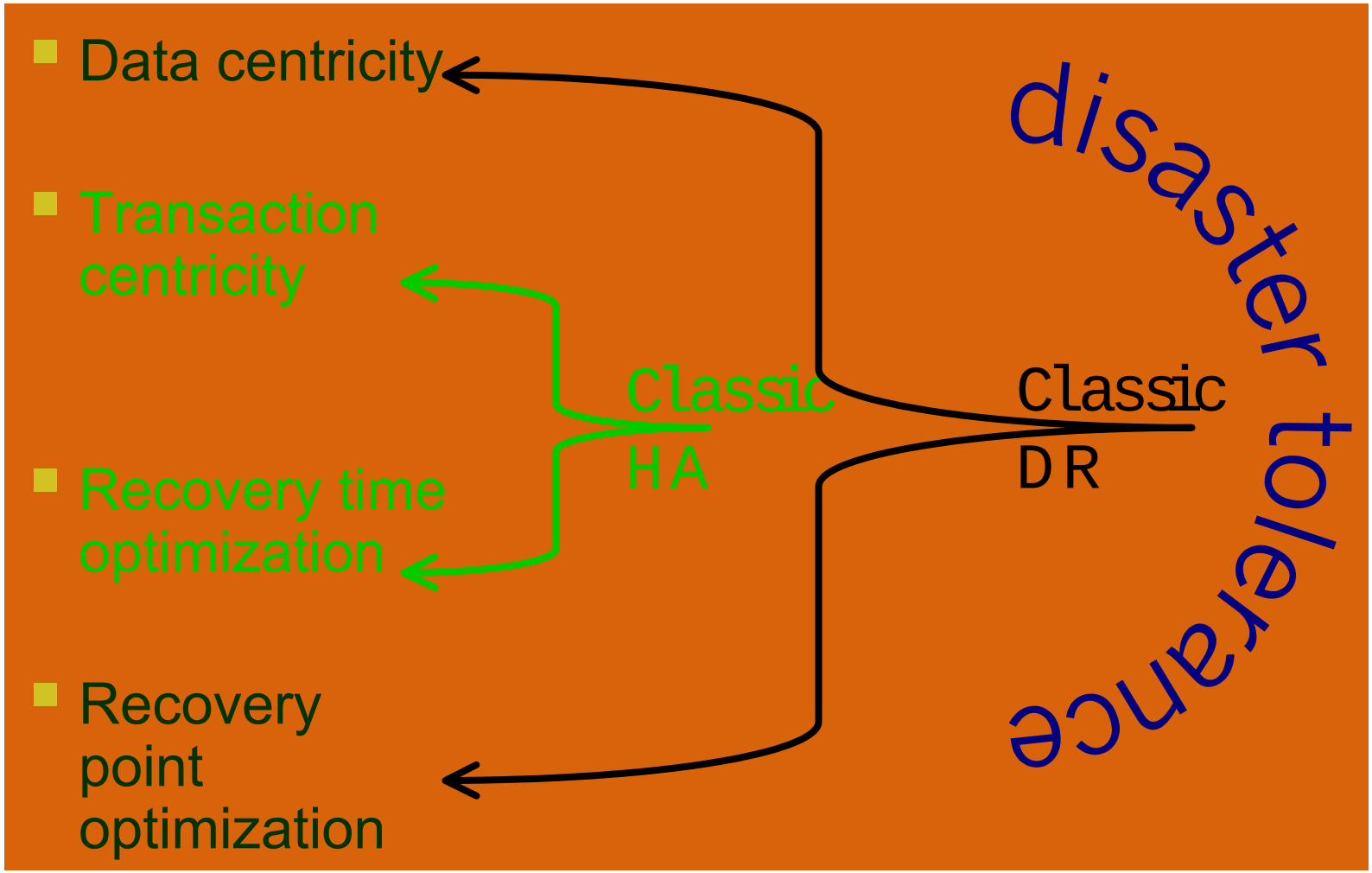
Example: Back Office



Example: Air Traffic Control

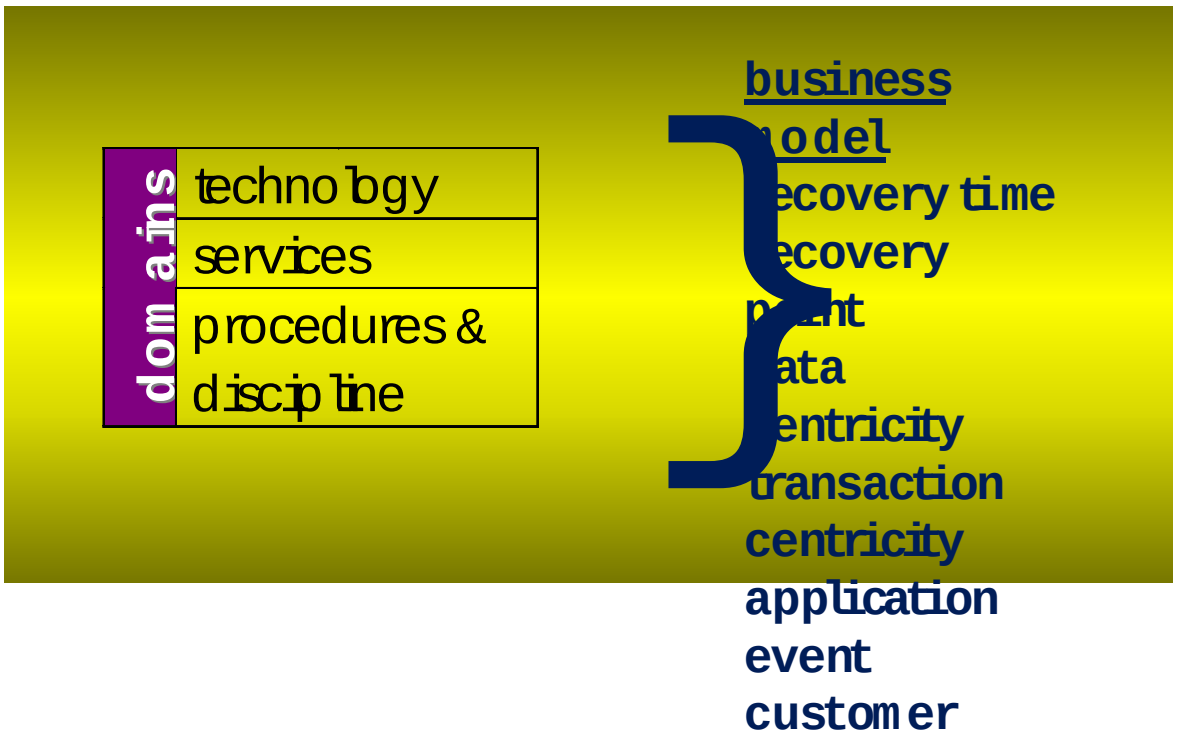


High Availability, Disaster Recovery, and Disaster Tolerance

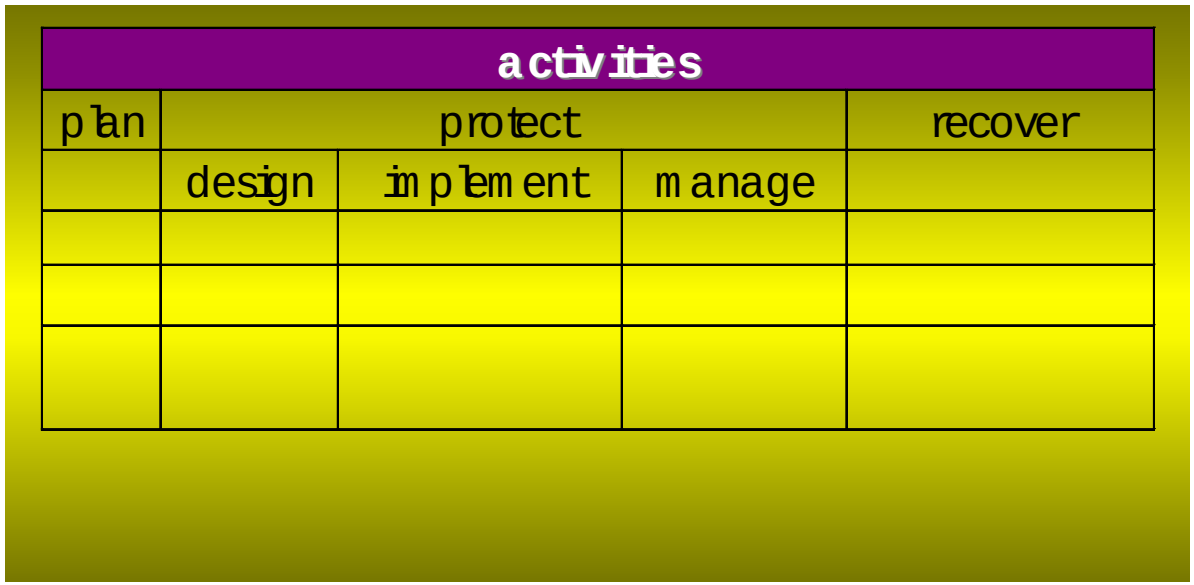


#2 Find The Balance Of Three Domains

Summary So Far



#3 Address the Dynamic Nature –Activities



Total Model

		activities				
		plan	protect			recover
			design	implement	manage	
domains	technology					
	services					
	procedures & discipline					

business model
recovery time
recovery point
data centricity
transaction centricity
application
event
customer

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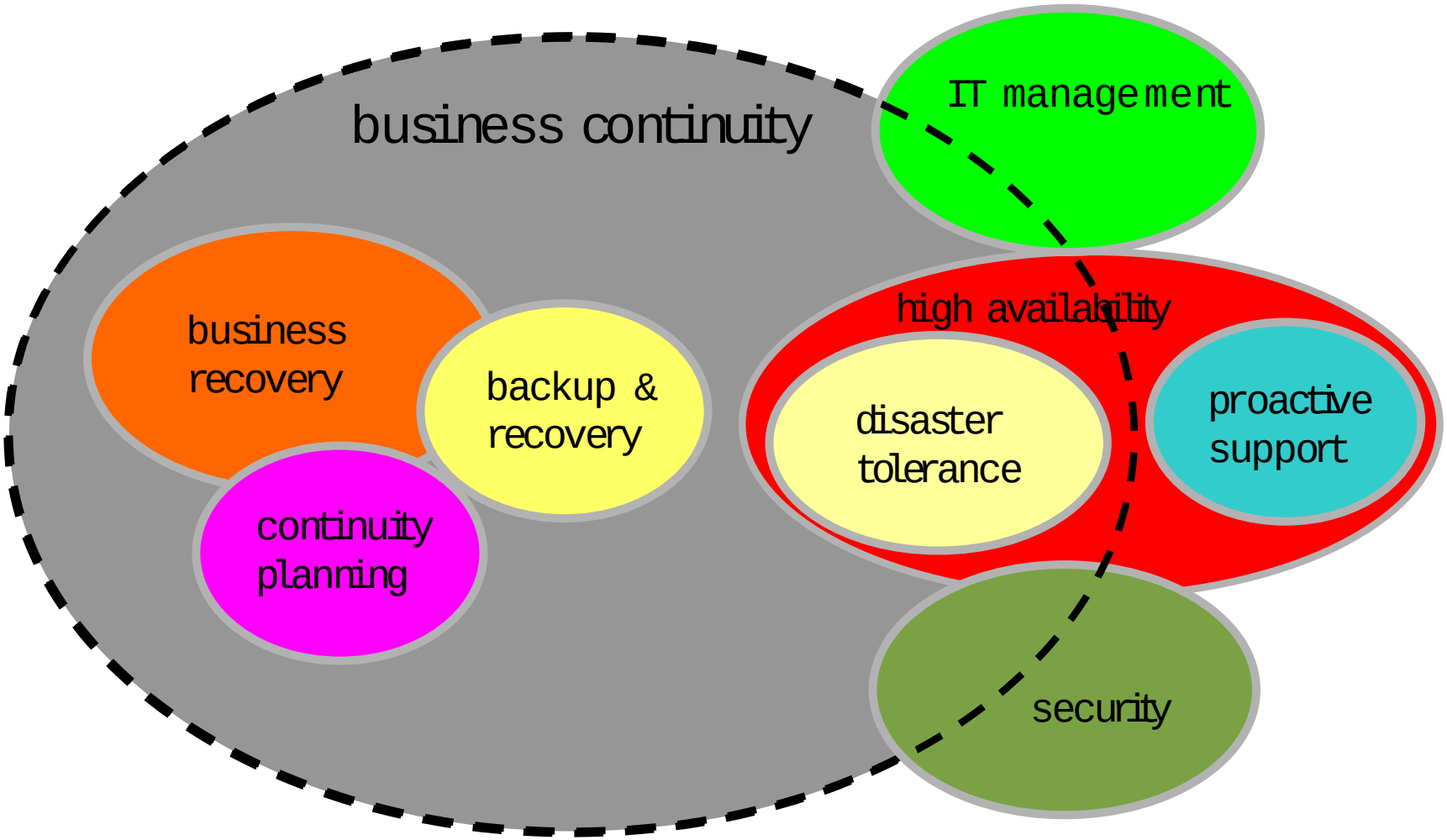
The HP View of Business Continuity

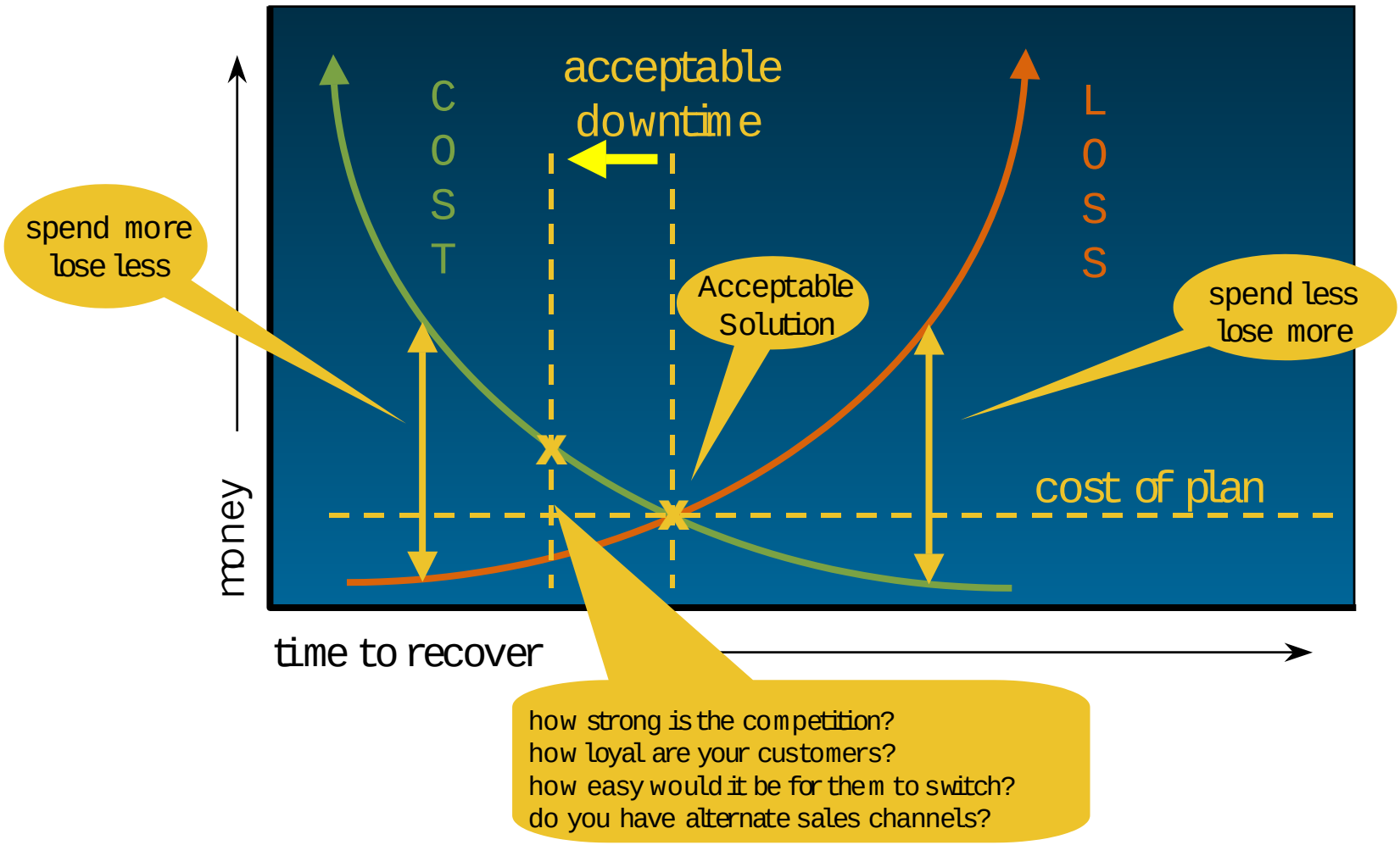


HP Technology for Business Continuity

HP has the right technology for virtually all customer needs and environments.

	High Availability	Fault Tolerance	Disaster Tolerance
StorageWorks	RAID, SAN, Multi-pathing, local mirror		Remote Mirroring & clustering
NonStop™	Built-in	Built-in	Remote Database Facility (RDF)
OpenVMS	OpenVMS Clusters, Volume Shadowing, etc.	With Reliable Transaction Router (RTR)	Disaster Tolerant Cluster (HPS Custom or DTCS)
UNIX®: HP-UX	HP Serviceguard	With Reliable Transaction Router (RTR)	3 cluster options: Campus, Metro, & Continental
Linux	HP Serviceguard	With Reliable Transaction Router (RTR)	Stretch cluster
UNIX®: Tru64 UNIX	TruCluster Server Software	With Reliable Transaction Router (RTR)	Campus Wide Cluster
ProLiant	Microsoft Cluster Services (MSCS)	With Reliable Transaction Router (RTR)	Stretch cluster

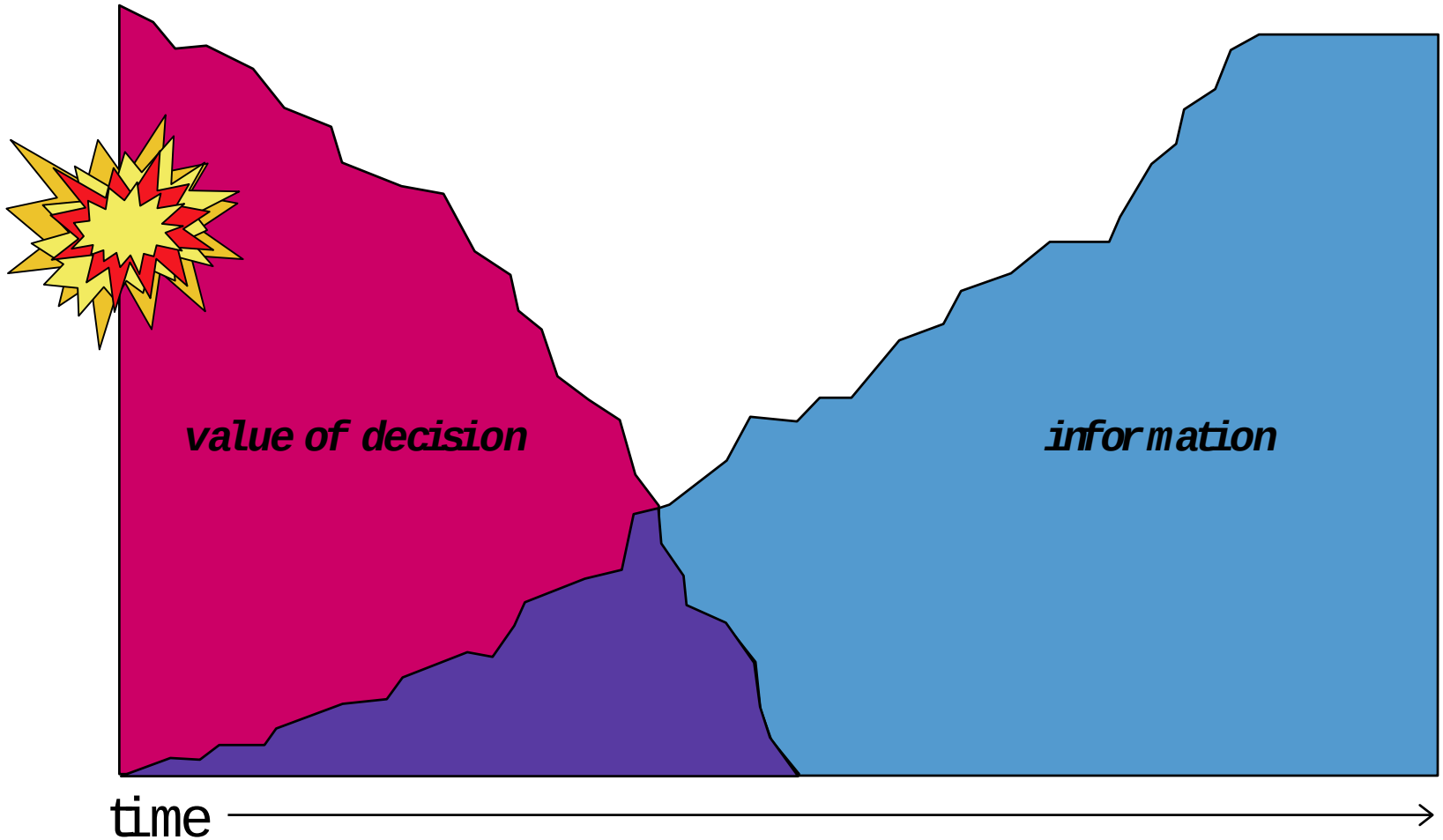
Nominal Justifiable Cost of Plan



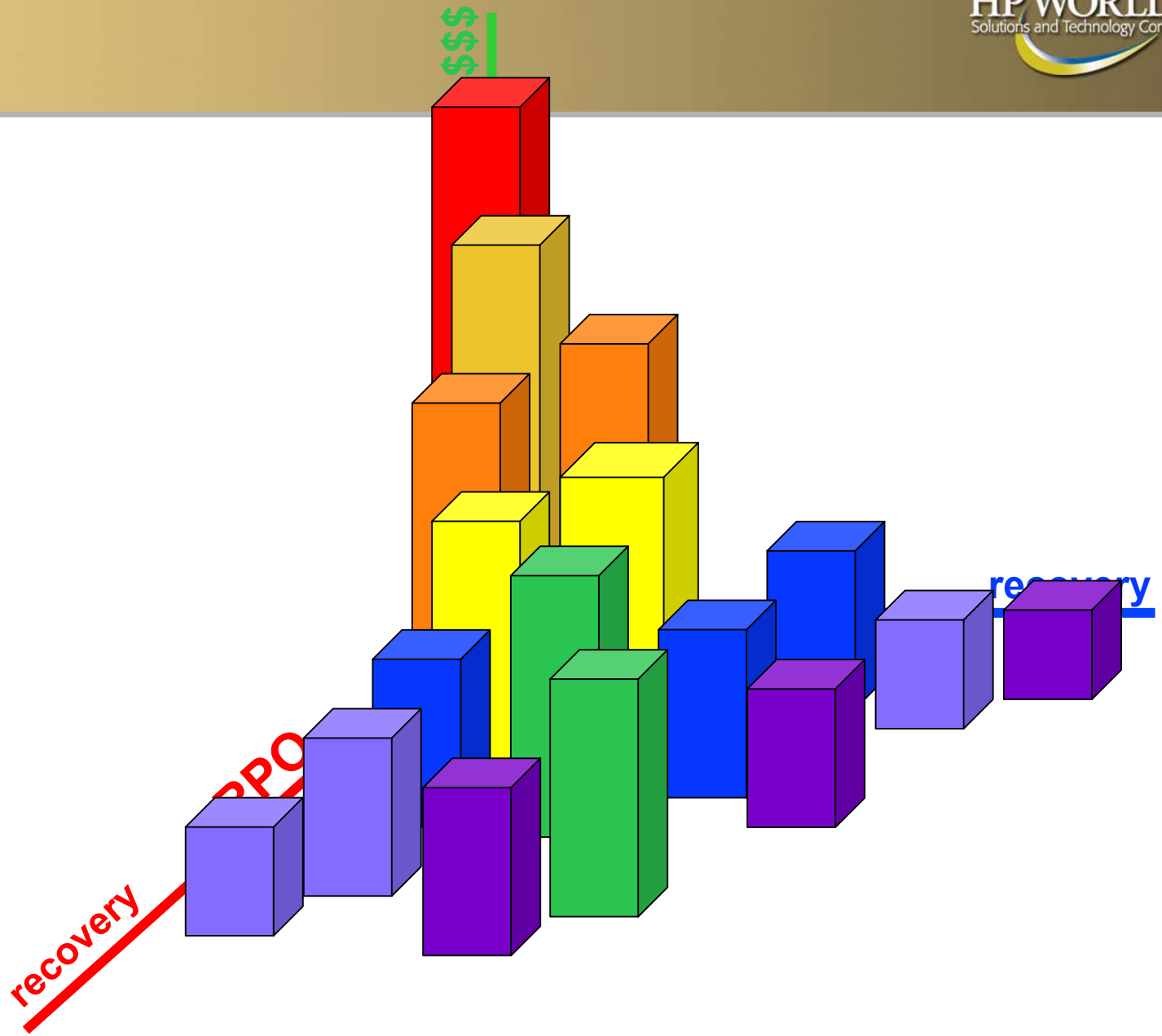
Separating Downtime and Data Loss

- **RTO - recovery time objective**
  - how soon after an event does the business process need to be available?
  - not all business processes need to be available *at* the same time
- **RPO - recovery point objective**
  - how much work in progress can be lost?
  - not all work needs to be recovered *to* the same time

Think Time Impacts RTO



Separating Downtime And Data Loss



OpenVMS for Itanium® architecture

SW Business Practice

SW Business Practices: hp OpenVMS for the Itanium® architecture

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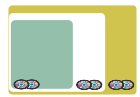
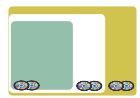
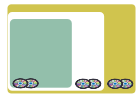
Operating Environment Packaging

OpenVMS packaging consistent with HP-UX OEs tier pricing paradigm

- ✓ **Foundation OE (FOE)** 
  - ✓ **Internet ready**, feature rich offering for **cost sensitive** situations
- ✓ **Enterprise OE (EOE)** 
  - ✓ **higher cost** feature set that delivers greater value in areas of **manageability, single system availability and performance**
- ✓ **Mission Critical OE (MCOE)** 
  - ✓ Has **high cost**, but delivers high value with **multi-system availability and workload management**
- ⌛ **Disaster Tolerant OE (DTOE)?**
  - ⌛ **GOAL** – **Product** with the **highest cost**, but delivers maximum value **multi-site and multi-system availability** configurations which are **resilient to disasters**

Business Continuity from OpenVMS

- **High Availability (MCOE)** 
  - Protects applications from single system, single site failures
- **Disaster Recovery***
  - Protects against application data loss
    - Not necessarily disaster tolerant or geographically separated sites.
- **Multi-Site Transaction Integrity***
  - Protects distributed computing environments by ensuring complete transaction integrity for multi-site transaction processing applications
- **Disaster Tolerance***
  - Protects applications from a disaster by providing remote site fail over

    And…
  - Protects application data by providing a copy of the data at a remote site

*** (+ HP & Partner Products + HP Services)**

OpenVMS for Itanium® architecture

SW Business Practice

SW Business Practices: OpenVMS Business Continuity…

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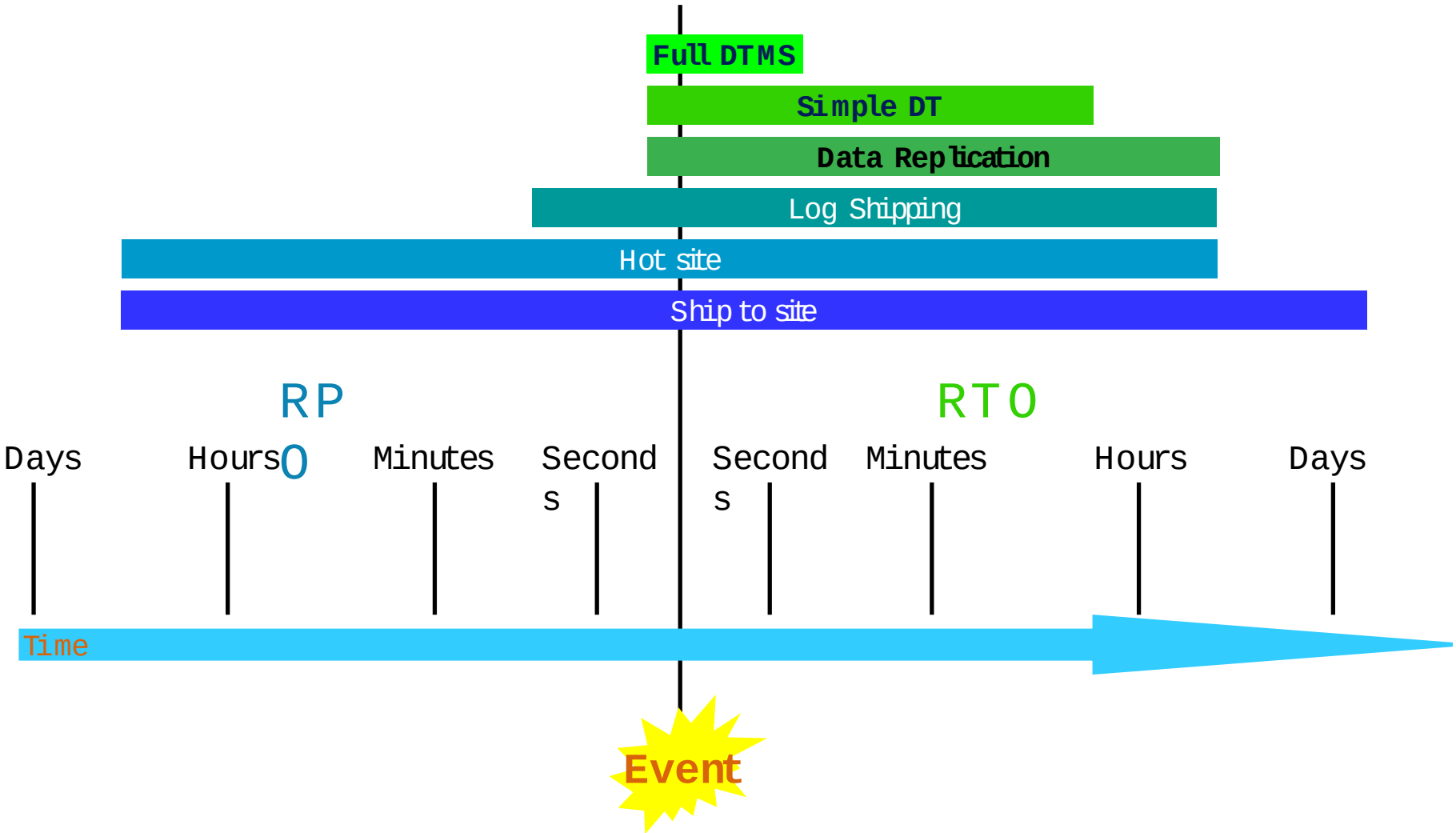
What we **created**…

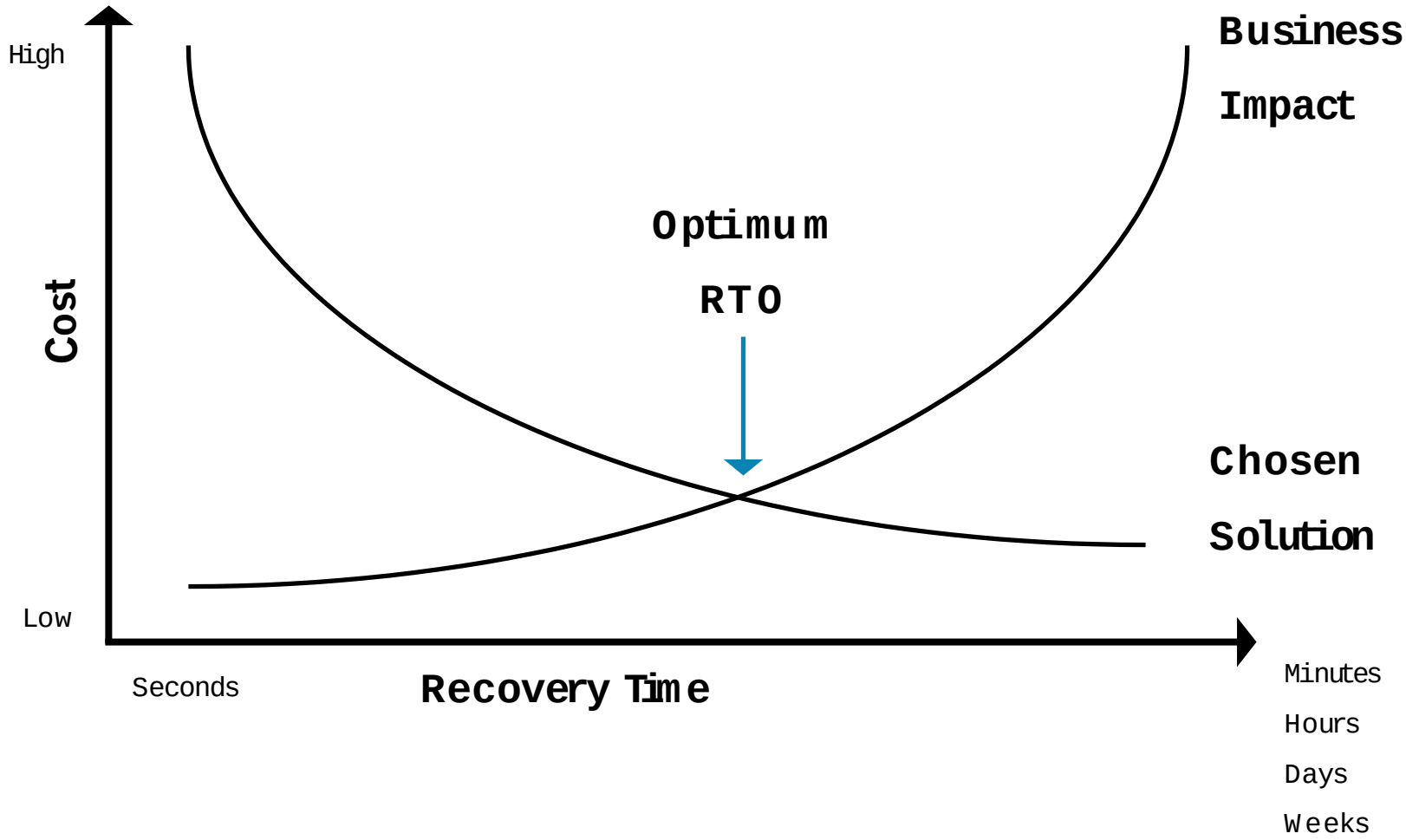
- ✓ **Disaster Tolerant Solution**
  - ✓ Start with appropriate number of **MCOE licenses**
  - ✓ Include appropriate **HP Business Partner component**
  - ✓ Add appropriate **HP Consulting Service component**

Plan, design, build, test, and manage/support with HP

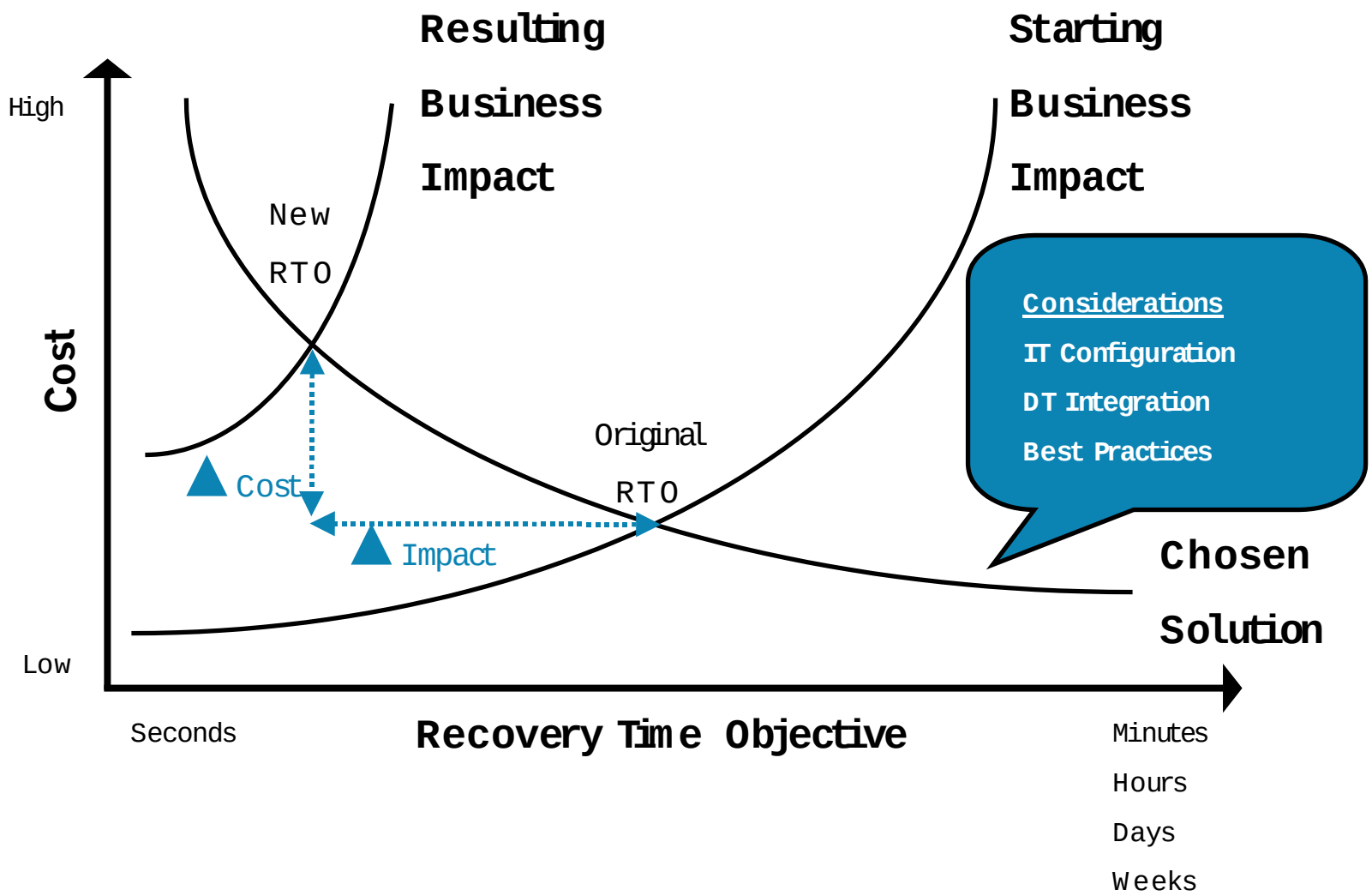
positioning disaster tolerance solutions



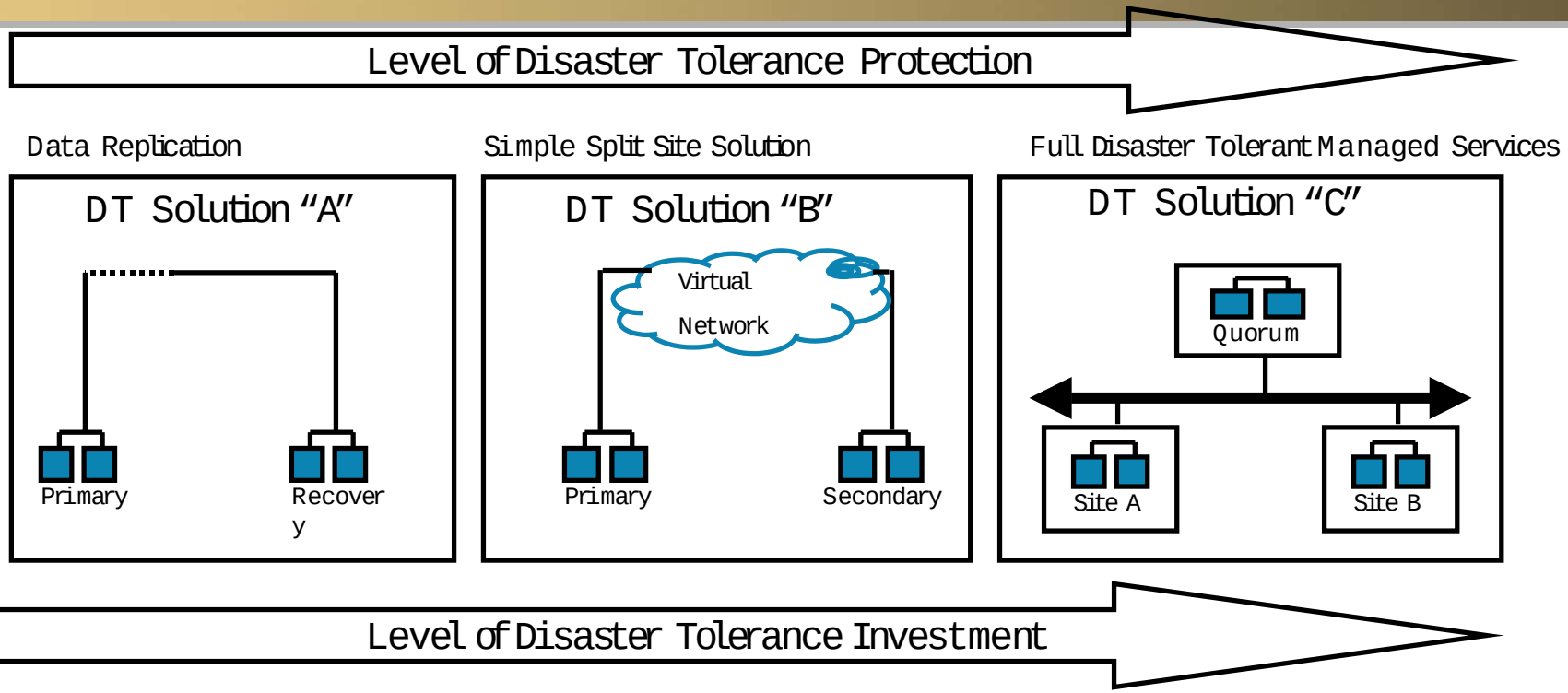
Solution Value Proposition



Solution Value – change...



business continuity solutions from OpenVMS



System Costs

- Number/Type of Servers
- MCOE per CPU
- Application Software

Solution Costs

- DTCS Packaged Consulting
  - Solution A = Data Replication
  - Solution B = Split Site Solution
  - Solution C = Full DTMS
- Option D = HPS Fully Customized

Cost Per Solution

- Hardware
- System/Application Software
- DTCS Packaged **or**
- Custom HPS Services

SW Business Practices: OpenVMS business continuity building blocks...

✓"Appropriate Number" of Mission CriticalOE (MCOE)

A

DTCS

DR Solution

Data Replication : baseline configuration and 2 days of consulting delivered from DTCS

OR

B

DTCS

Simple DT Solution

Simple Split Site Disaster Tolerance : 4 days of solution consulting delivered from DTCS

OR

C

DTCS

Fully DT Solution

Full Disaster Tolerant Managed Services configuration with 10 days of DTCS consulting

✓ **Pre-Defined Services**

OR

Custom

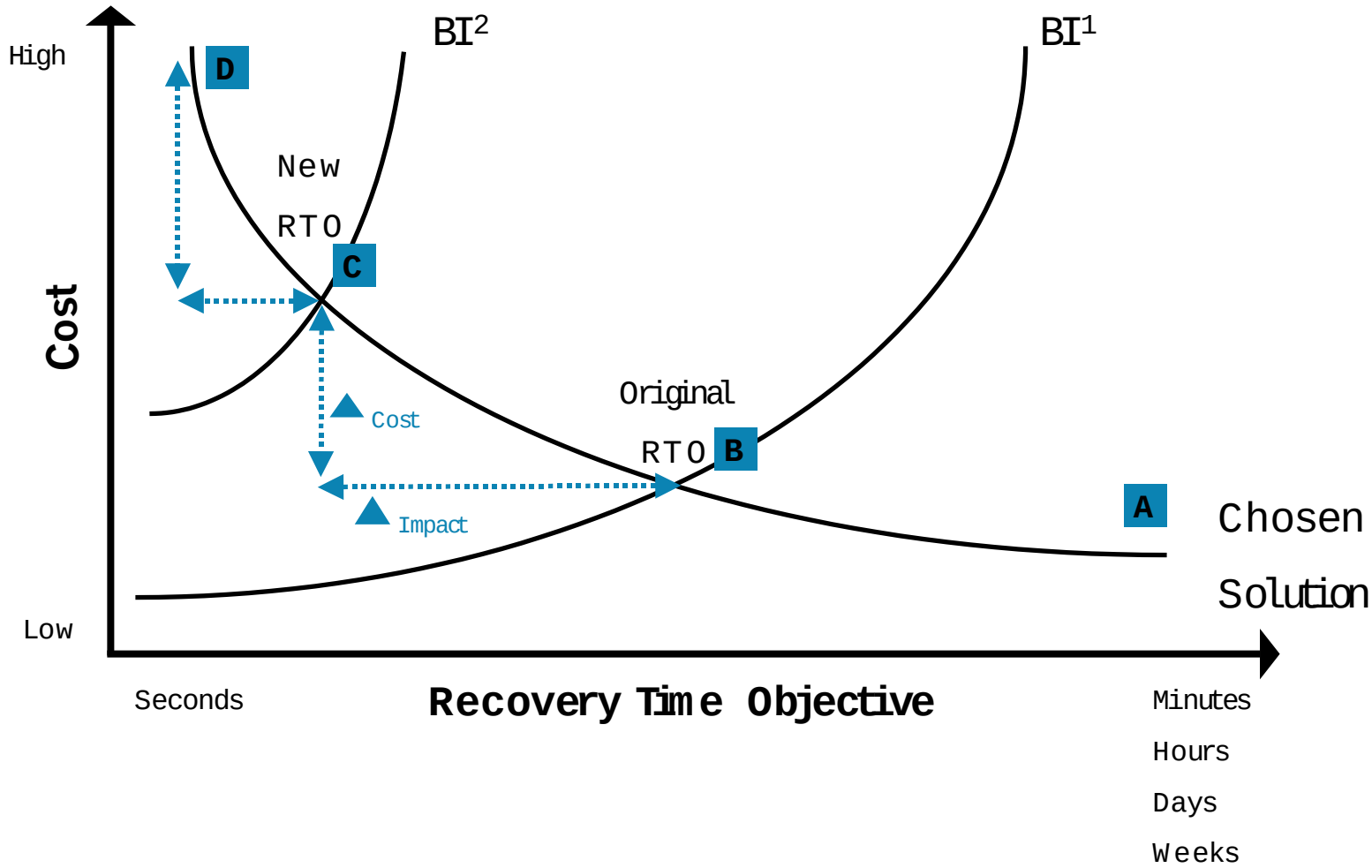
Solution

customized consulting from DTCS or HPS

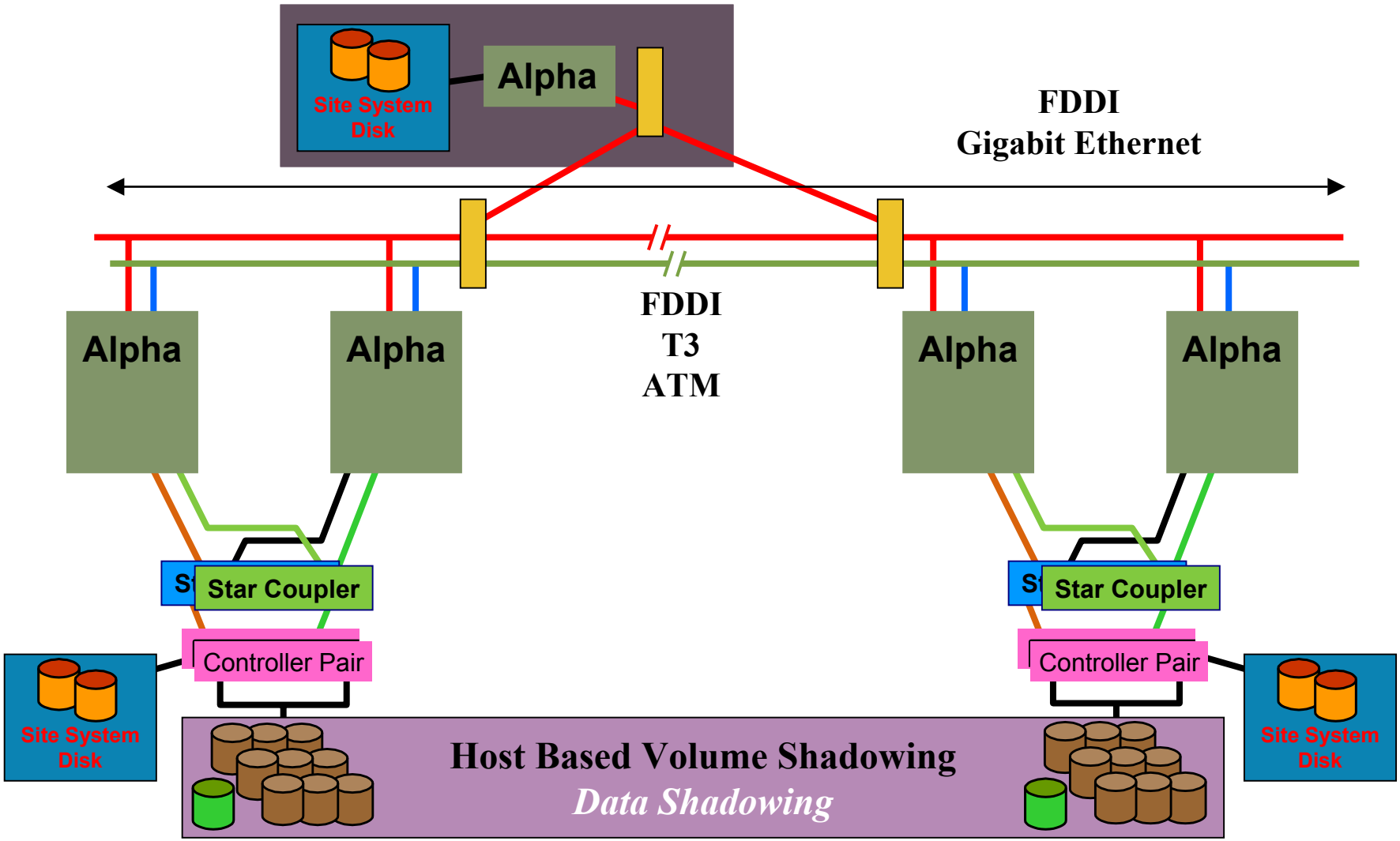
✓ **Fully Customized Services**

RESULTING IN the ultimate customer experience … from data recovery to protection of transactions to disaster tolerance for your data and applications

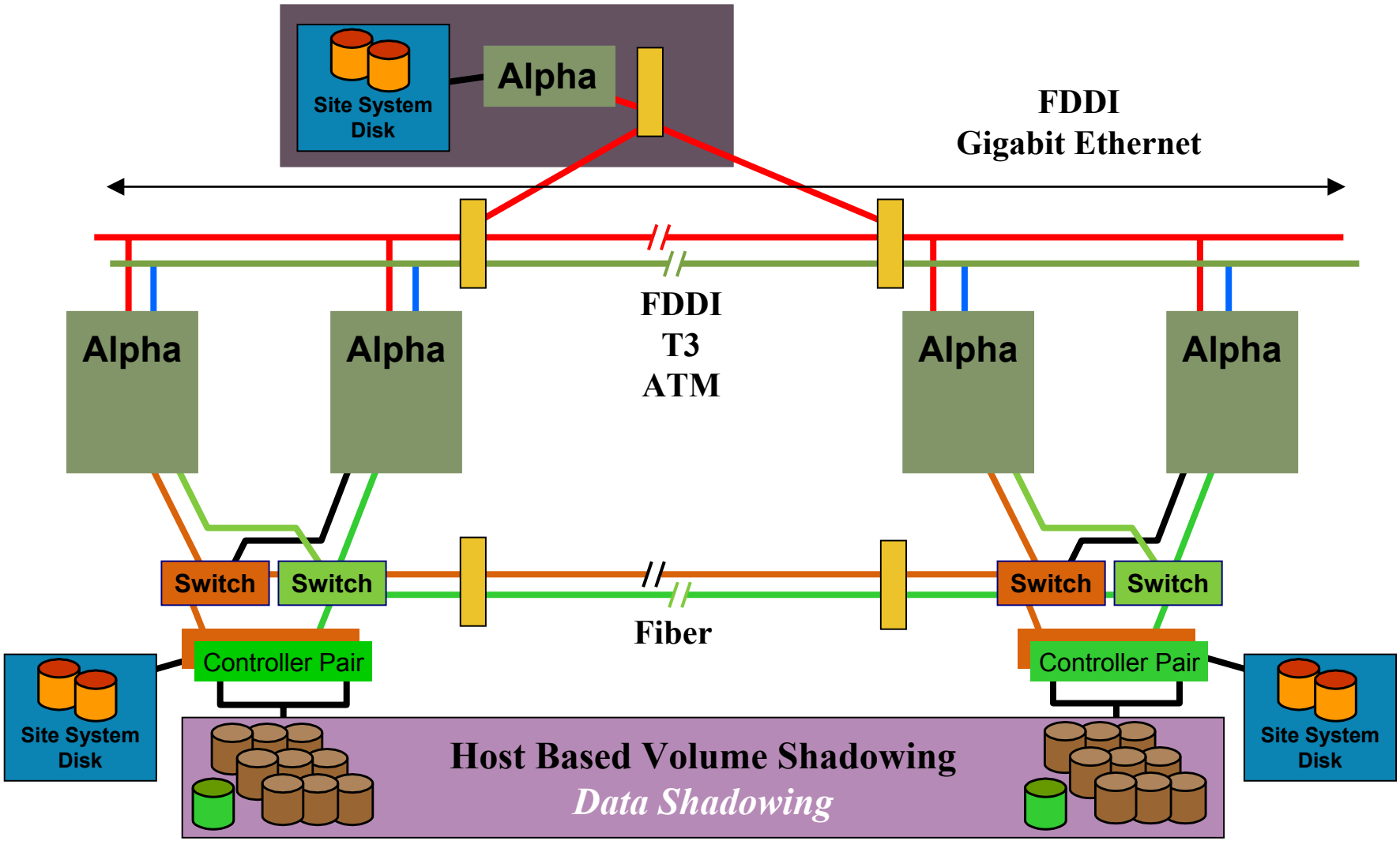
Impact of "Building Block" Choice



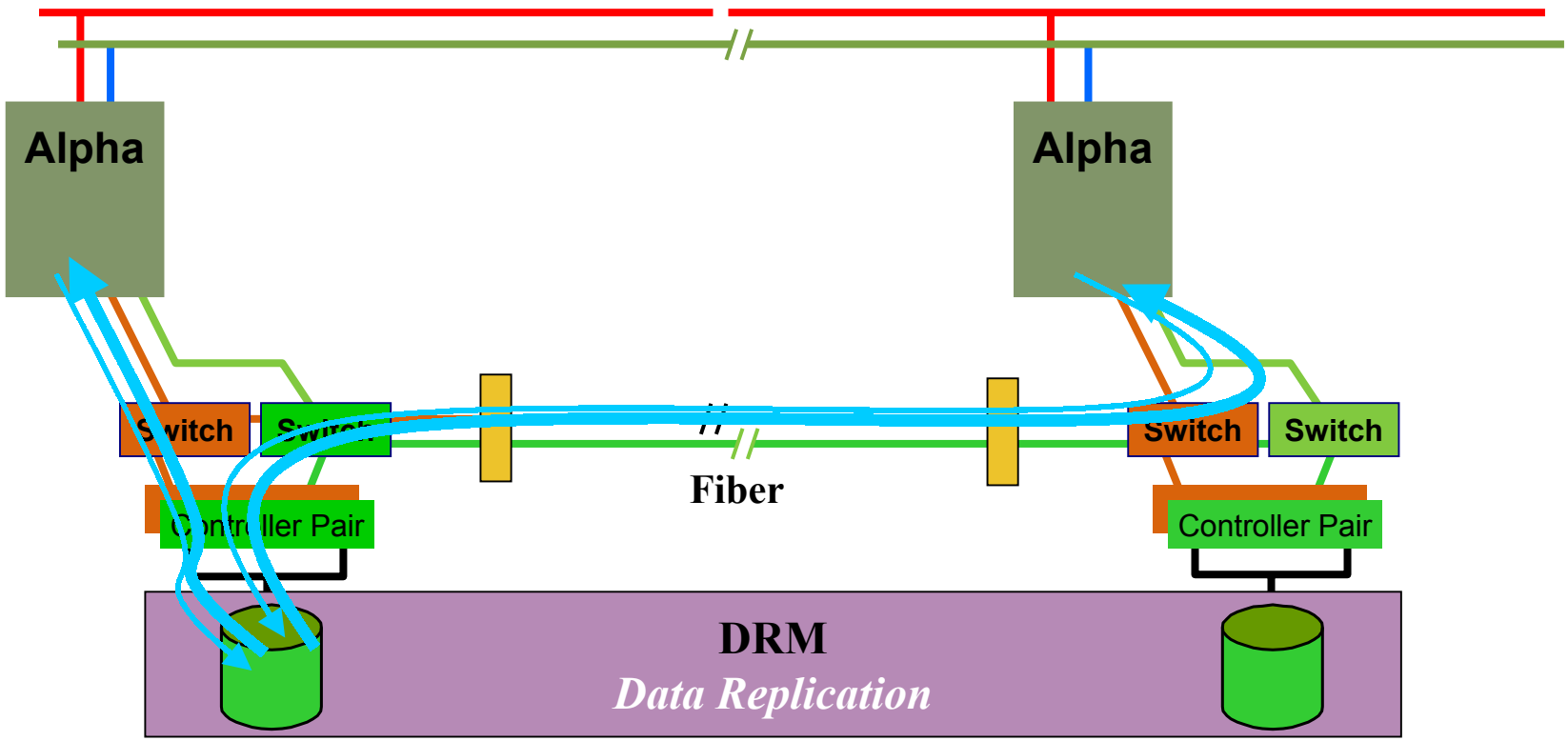
conventional OpenVMS cluster design



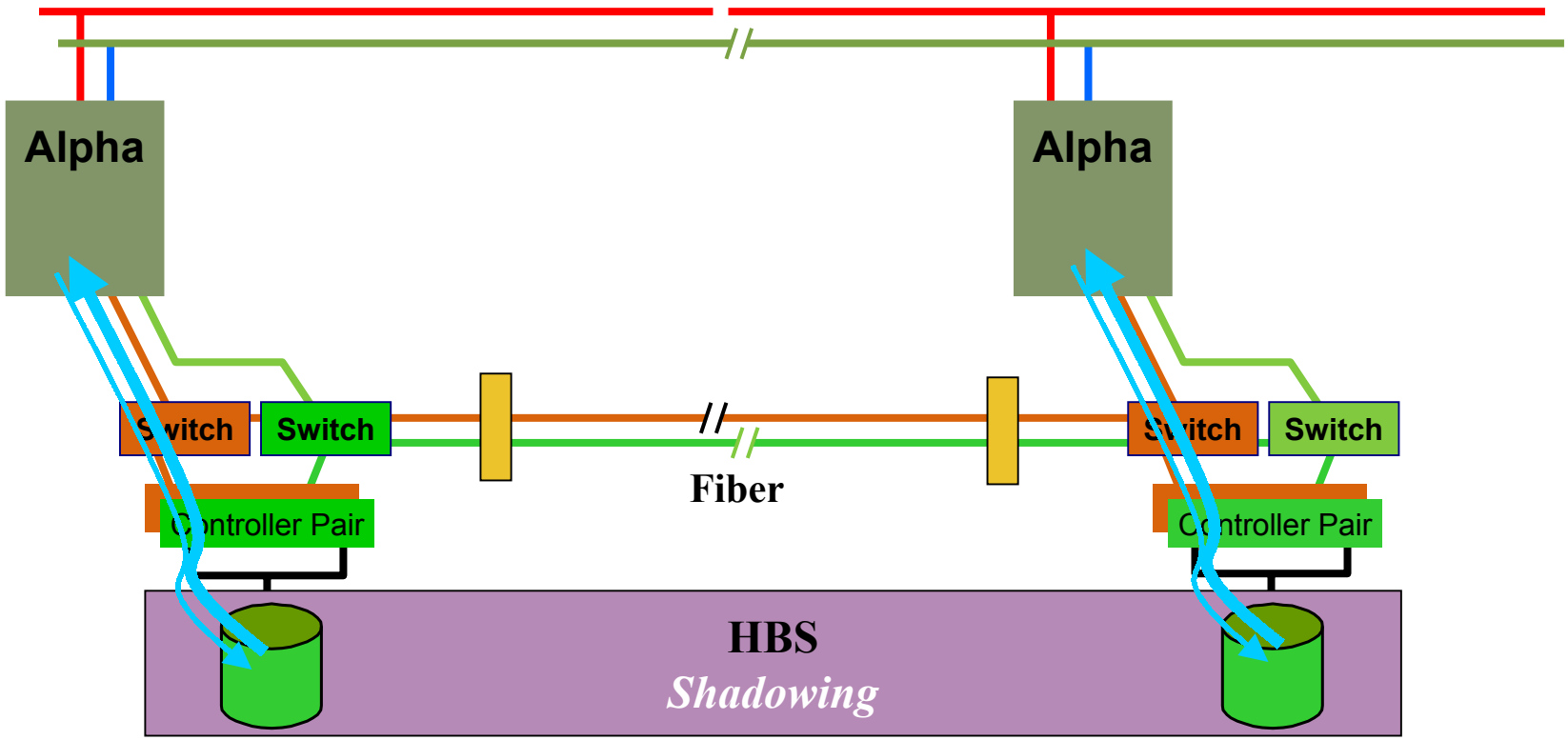
"next generation" DT - OpenVMS & FibreChannel



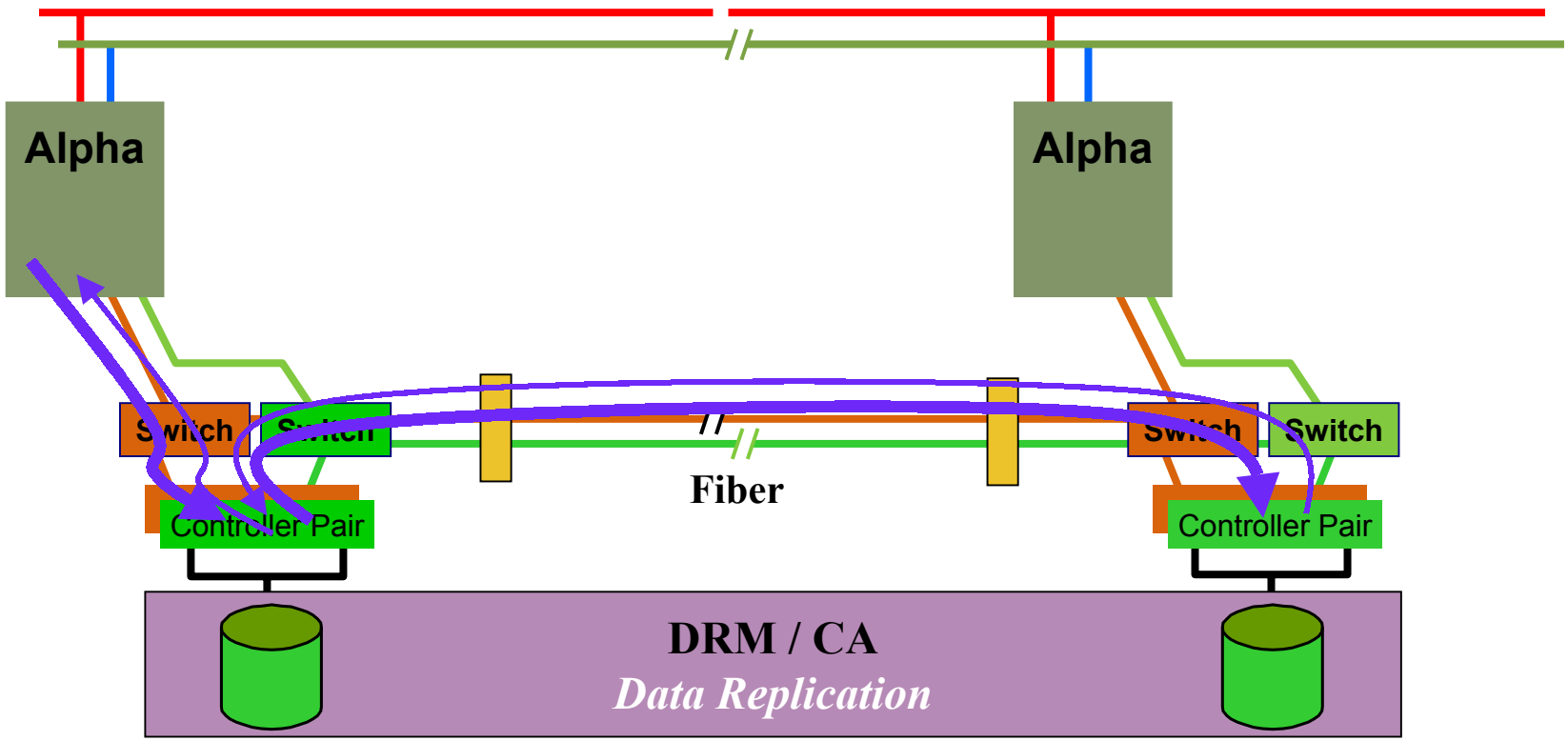
DRM & CA - Reading



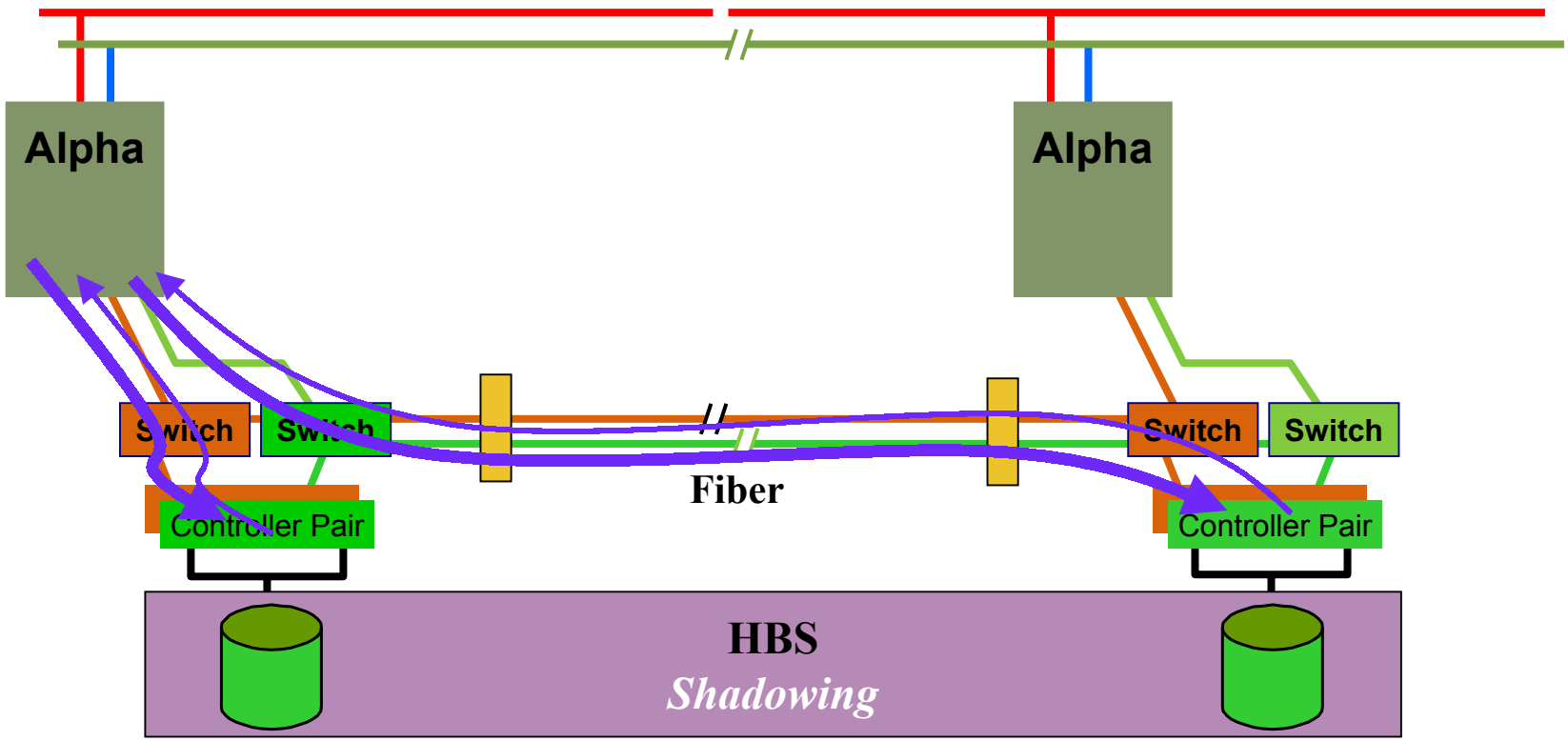
Host-Based Shadowing - Reading



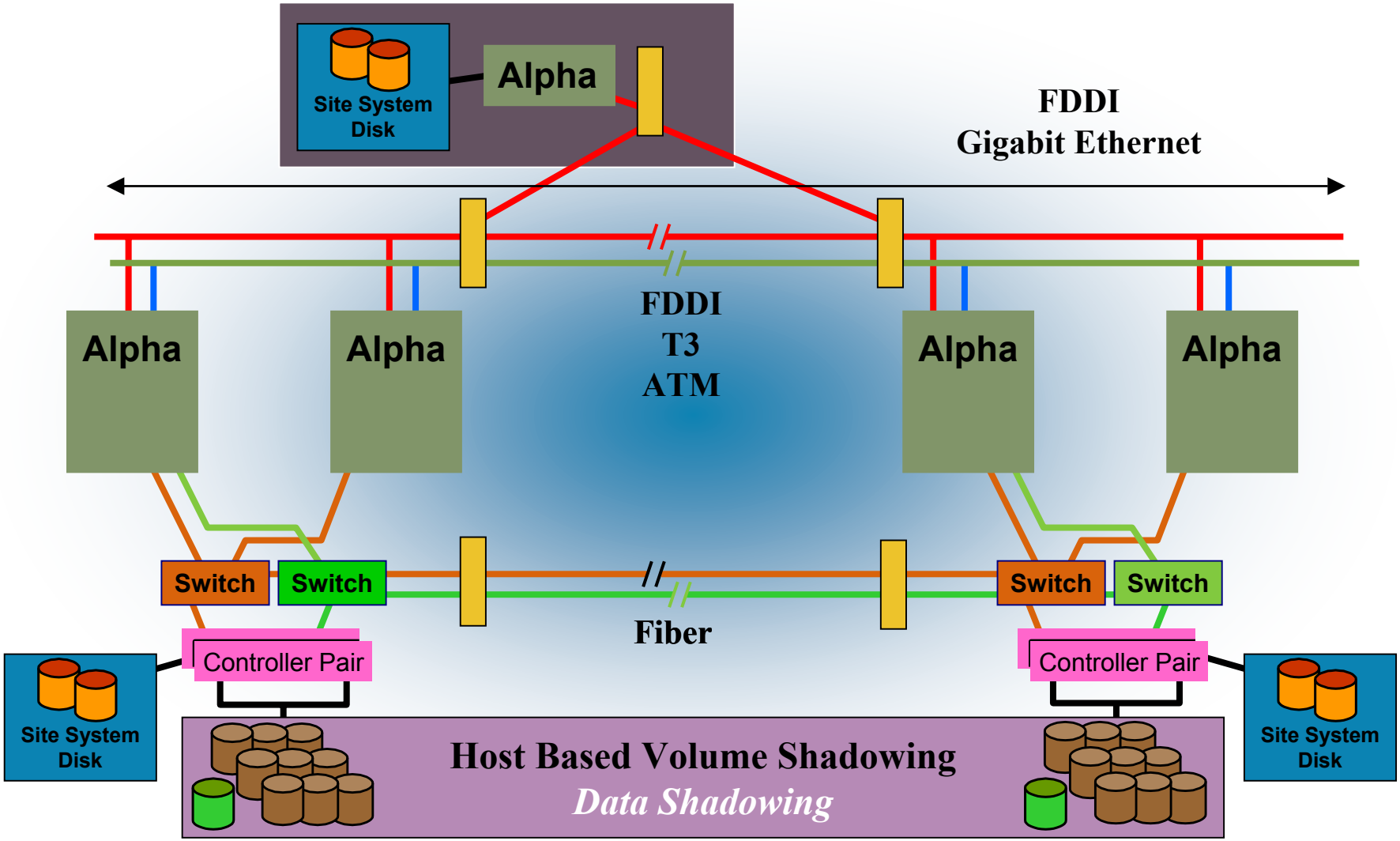
DRM & CA - Writing



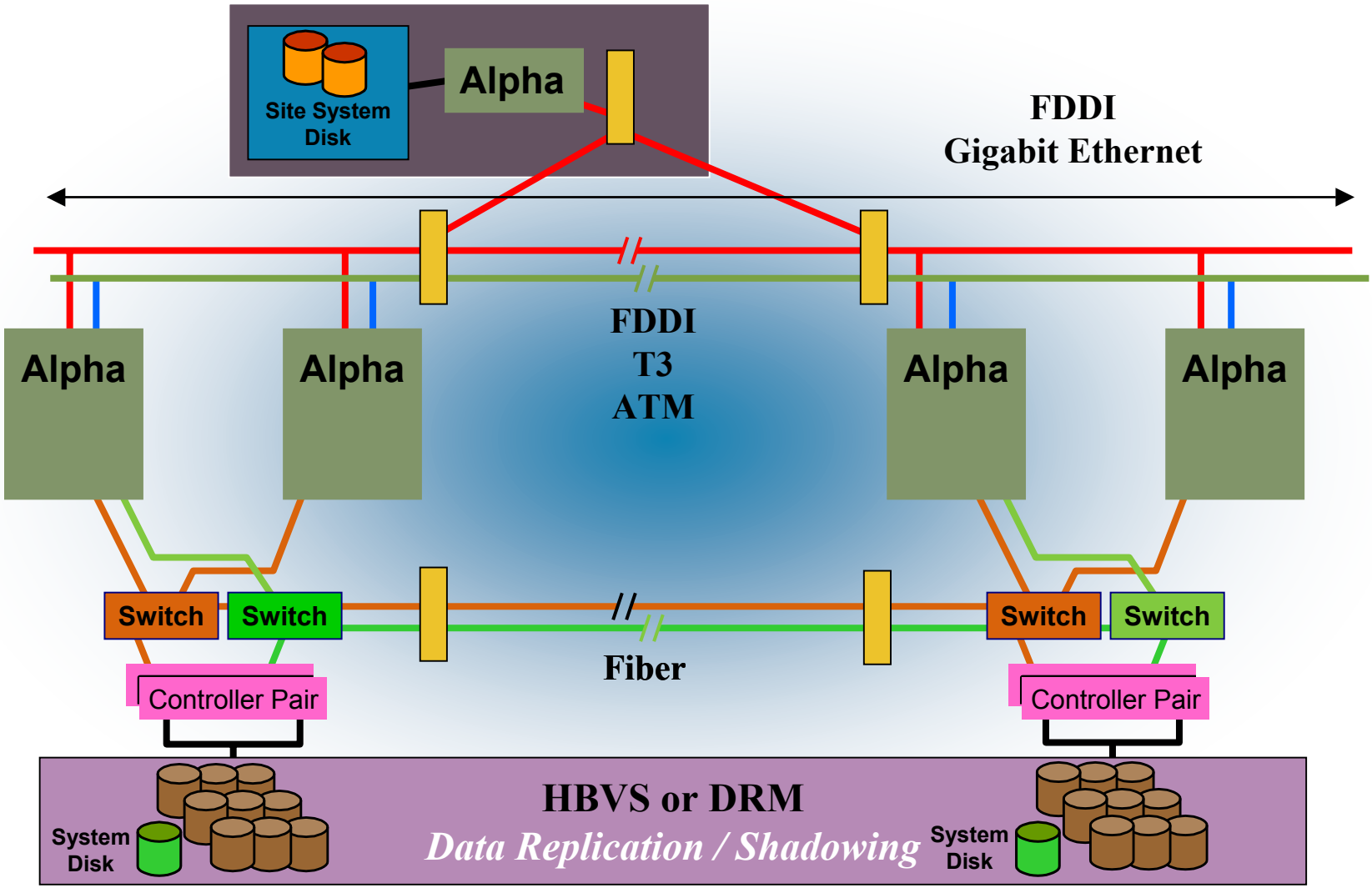
Host-Based Shadowing - Writing



system disk design - 1

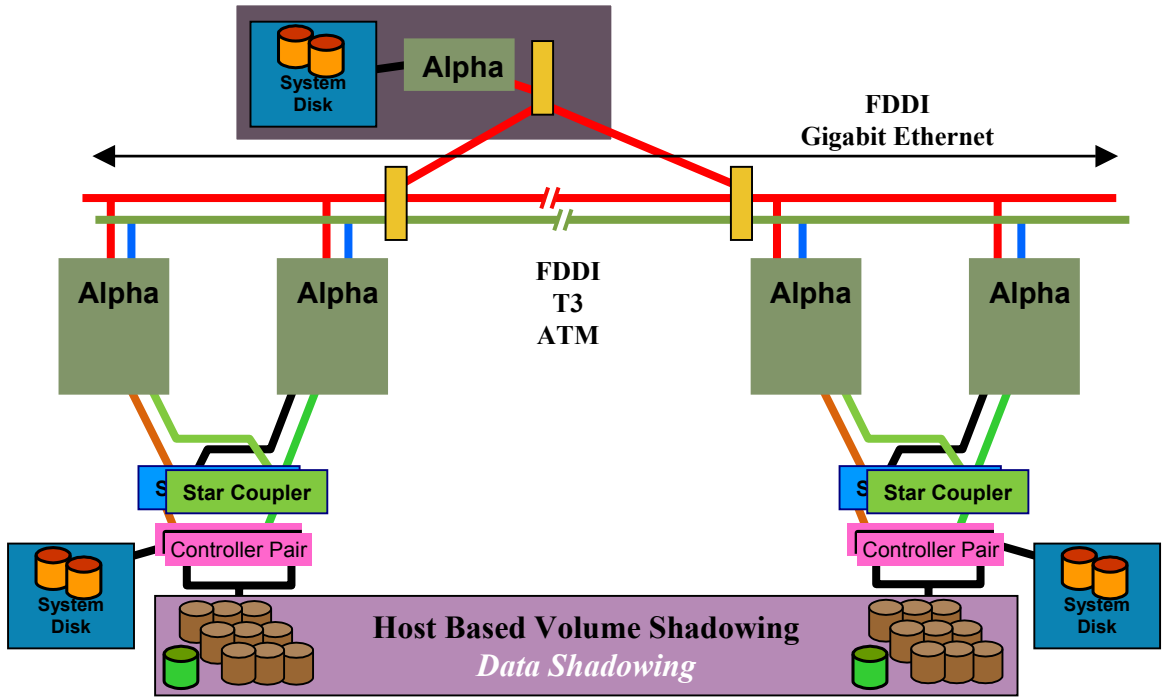


system disk design - 2

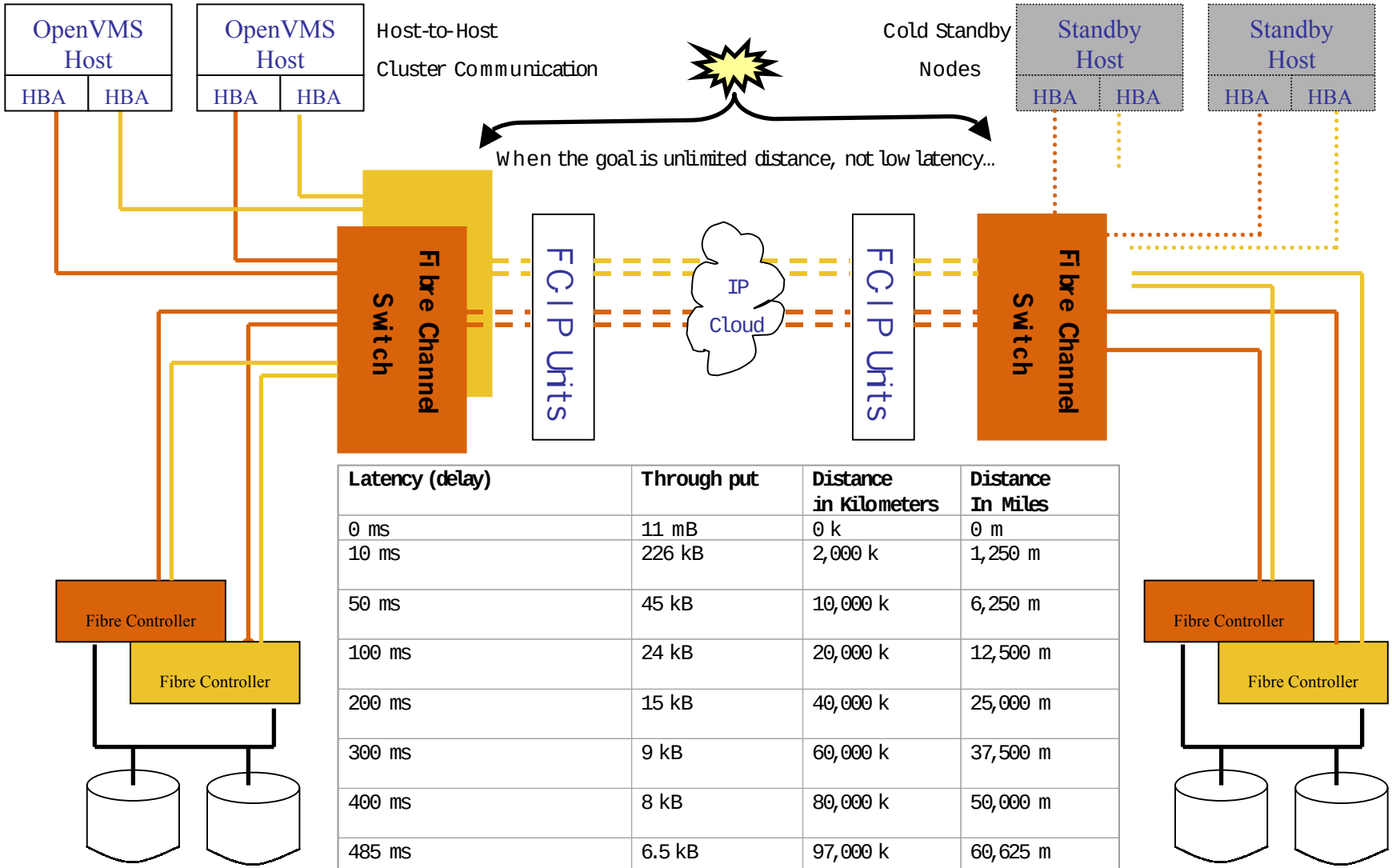


quorum

- keep quorum equal on each site
  - uneven quorum risks “creeping doom”
- use quorum site or out-of-band quorum adjustment
  - Availability manager or DTCS management tools
- use boot time commands to implement single-site booting



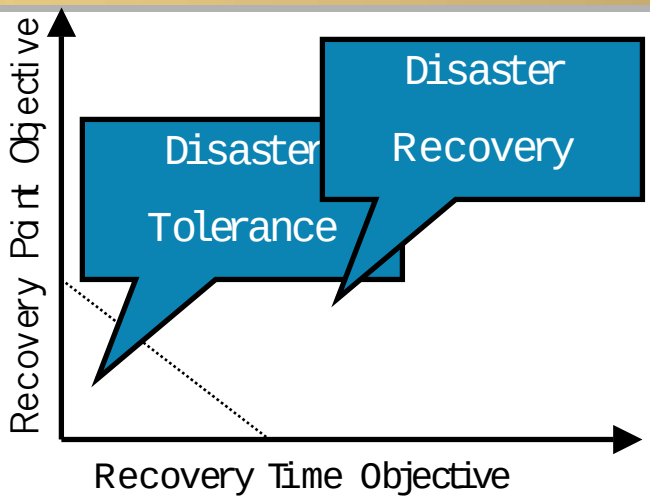
Fibre Channel Over IP… Unlimited Distance for Data Replication



Latency (delay)	Through put	Distance in Kilometers	Distance In Miles
0 ms	11 mB	0 k	0 m
10 ms	226 kB	2,000 k	1,250 m
50 ms	45 kB	10,000 k	6,250 m
100 ms	24 kB	20,000 k	12,500 m
200 ms	15 kB	40,000 k	25,000 m
300 ms	9 kB	60,000 k	37,500 m
400 ms	8 kB	80,000 k	50,000 m
485 ms	6.5 kB	97,000 k	60,625 m

This chart shows the through put at different distances using 1 gb for the testing & then we stopped testing!

What problem are you trying to solve?



- **What is your goal?**
  - **Is it throughput** versus distance?

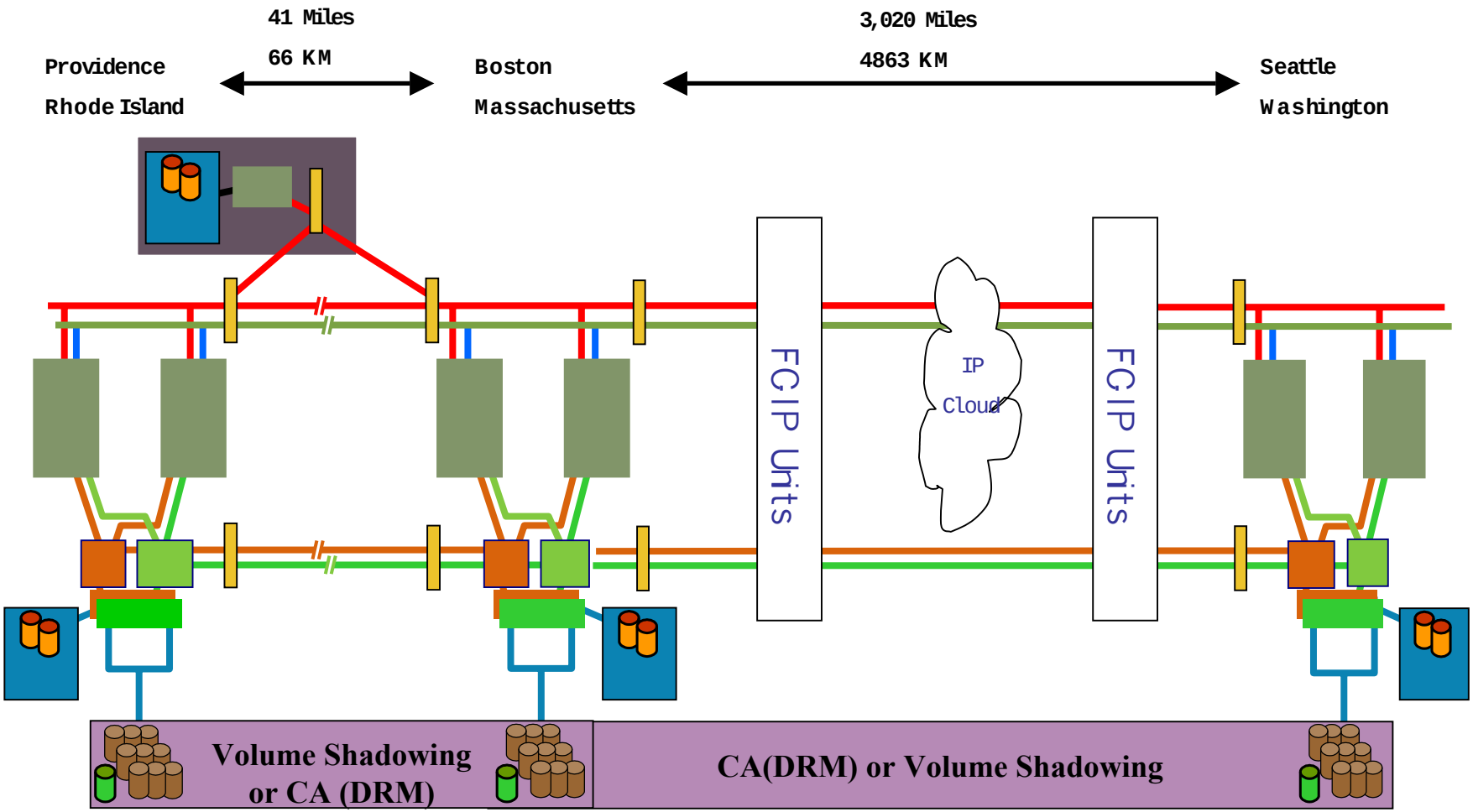
    …OR

  - **Is it distance** versus throughput?

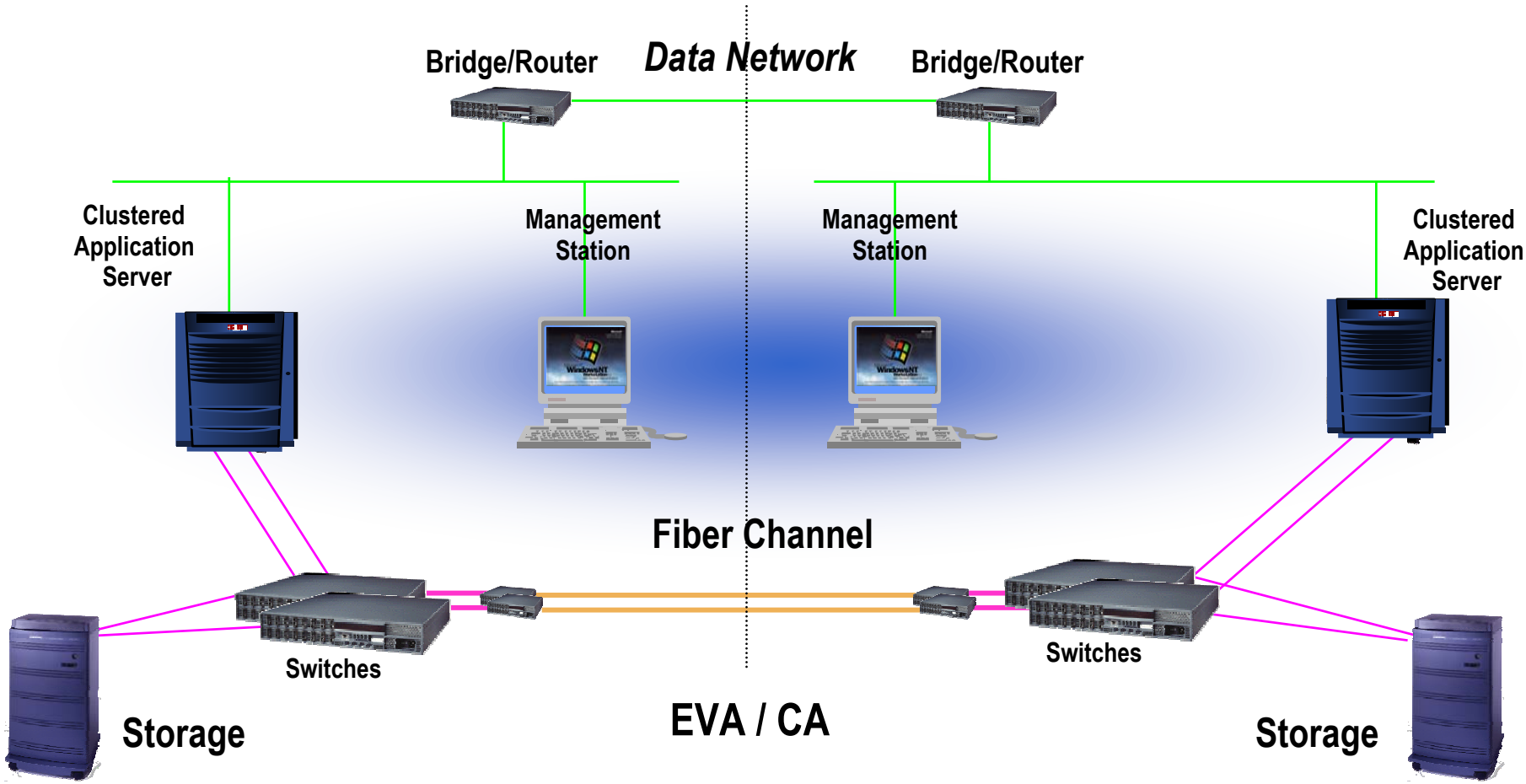
- With FibreChannel Interconnect over IP, you can **ACHIEVE EITHER** depending on your needs (or both!)
- Can you afford ~30ms latency between your Boston primary site and a site in San Diego? If you can, then go for it…!
- There are **TWO WAYS** to meet your business needs … Host-Based Volume Shadowing & Data Replication Management

- What is your **Recovery Point Objective**?
- What is your **Recovery Time Objective**?

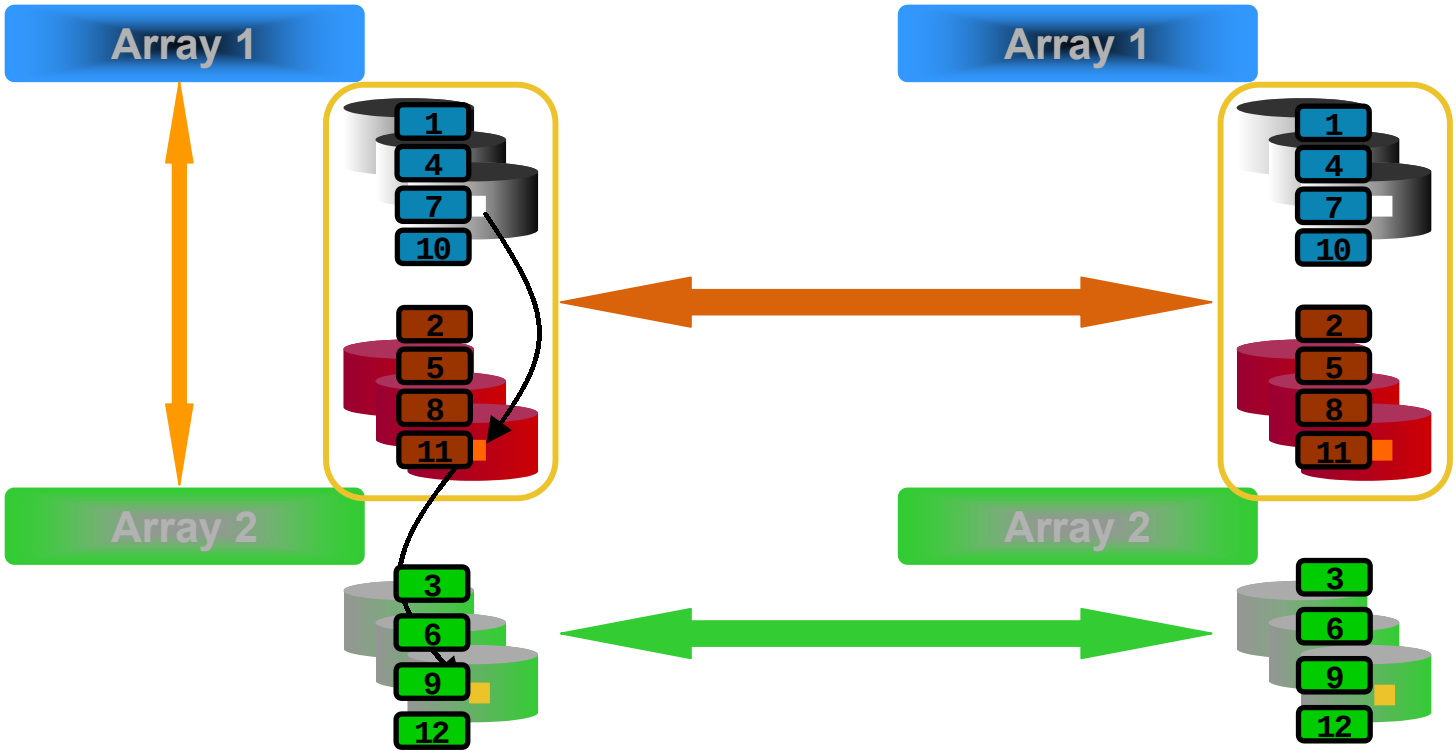
HBVS and DRM in the SAME environment !



StorageWorks EVA CA / HSG DRM



sync or async?



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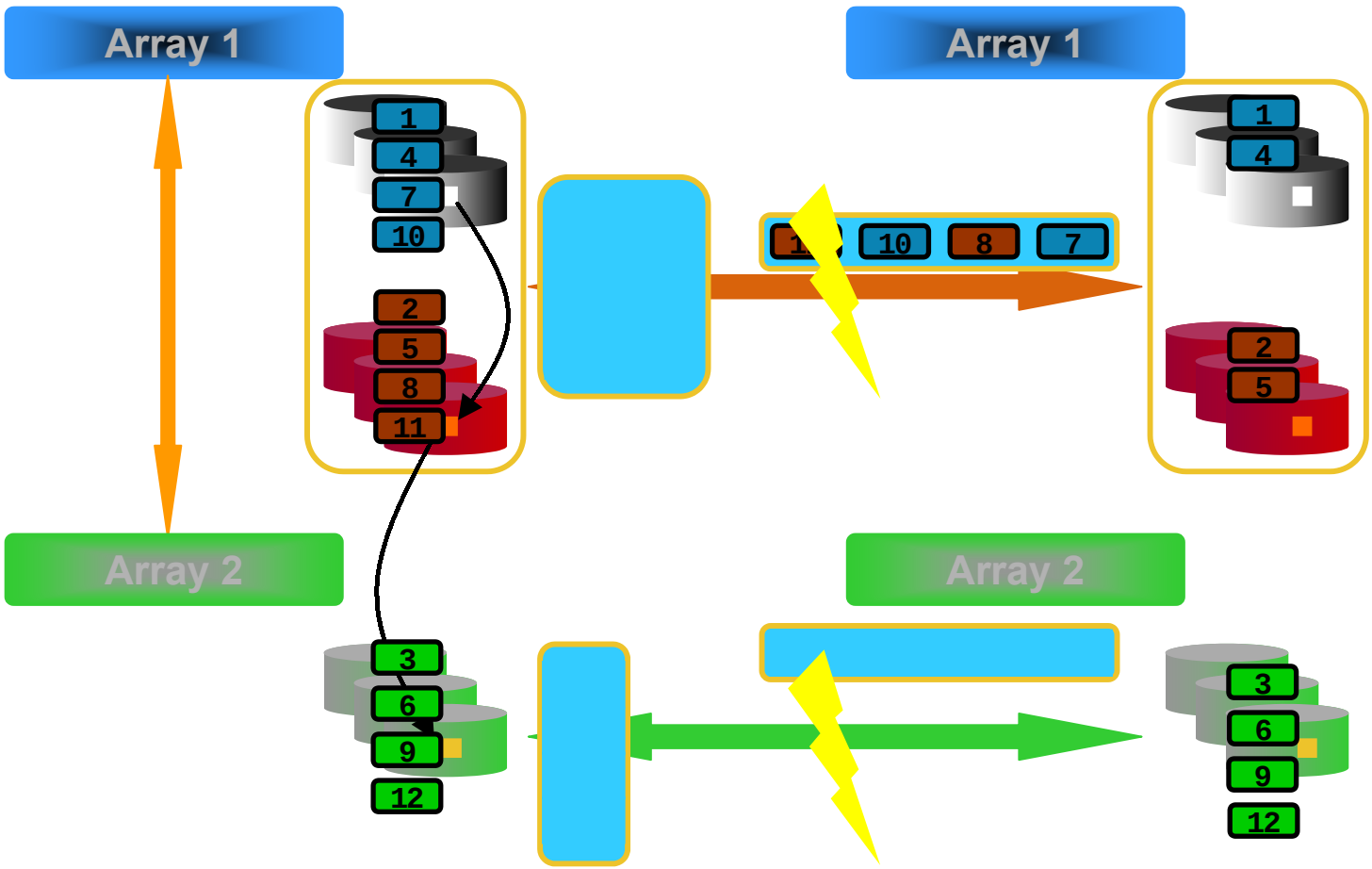
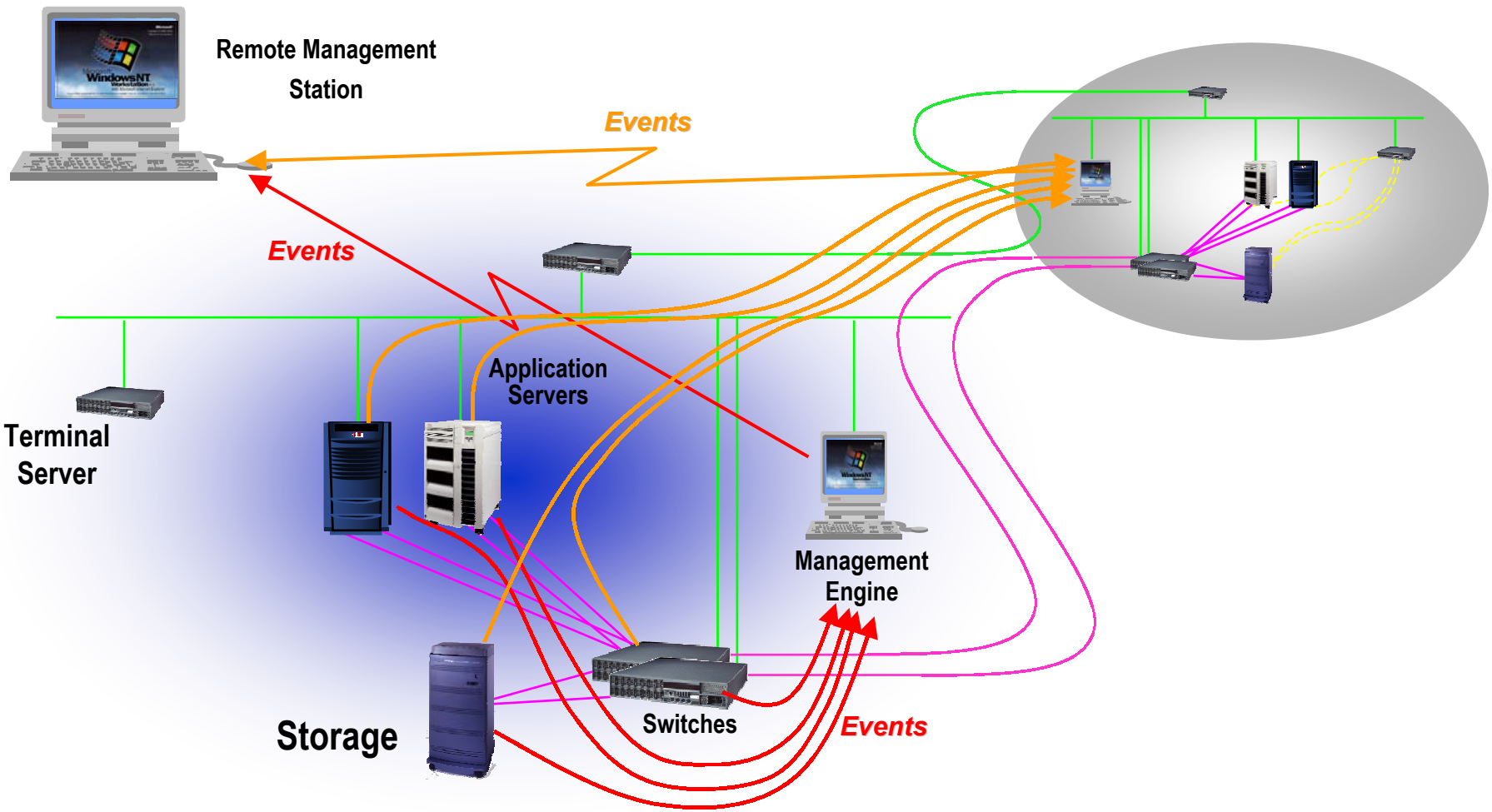


Effective Management

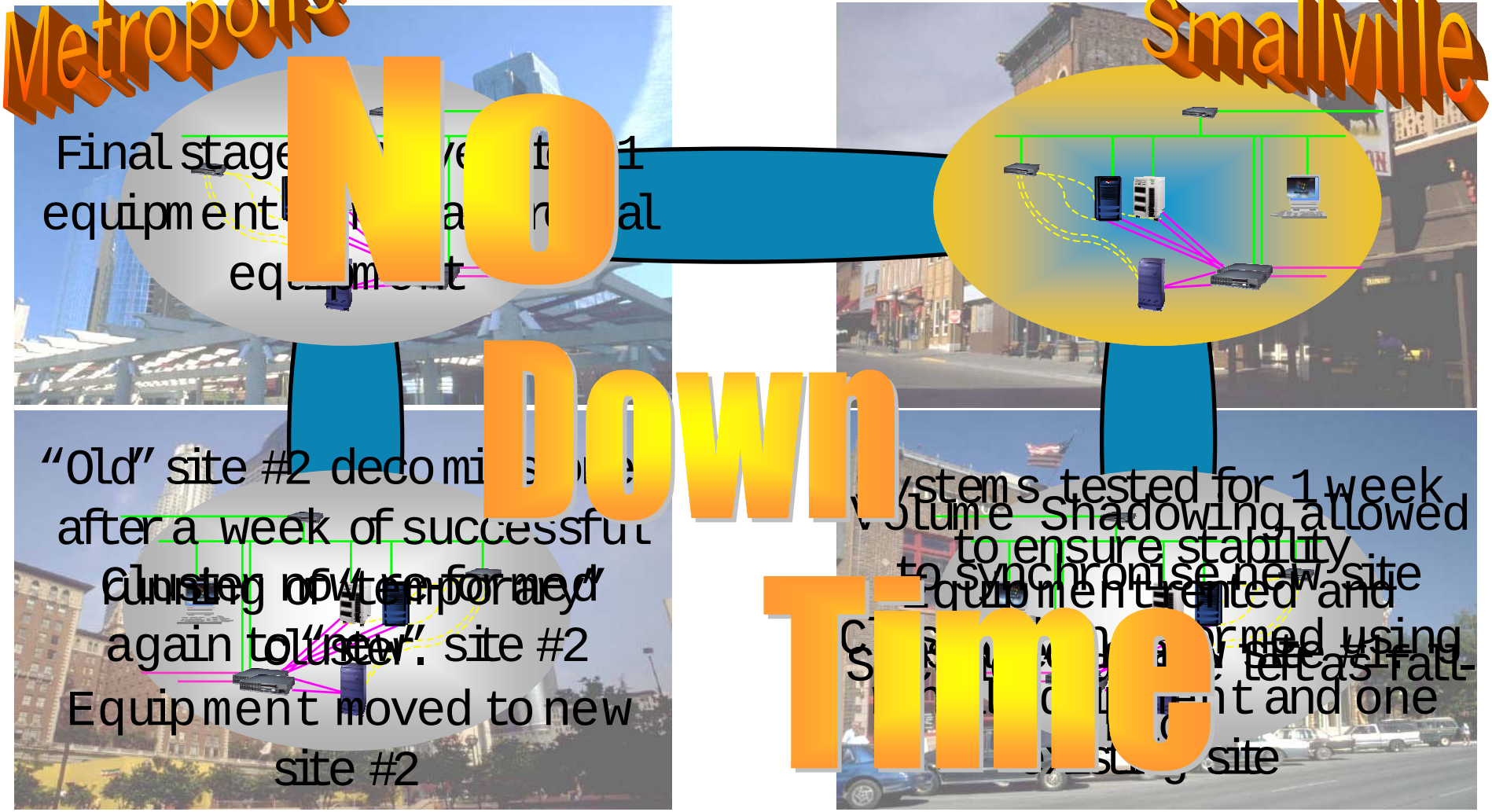


How do I move a mission critical cluster (an actual case example…)

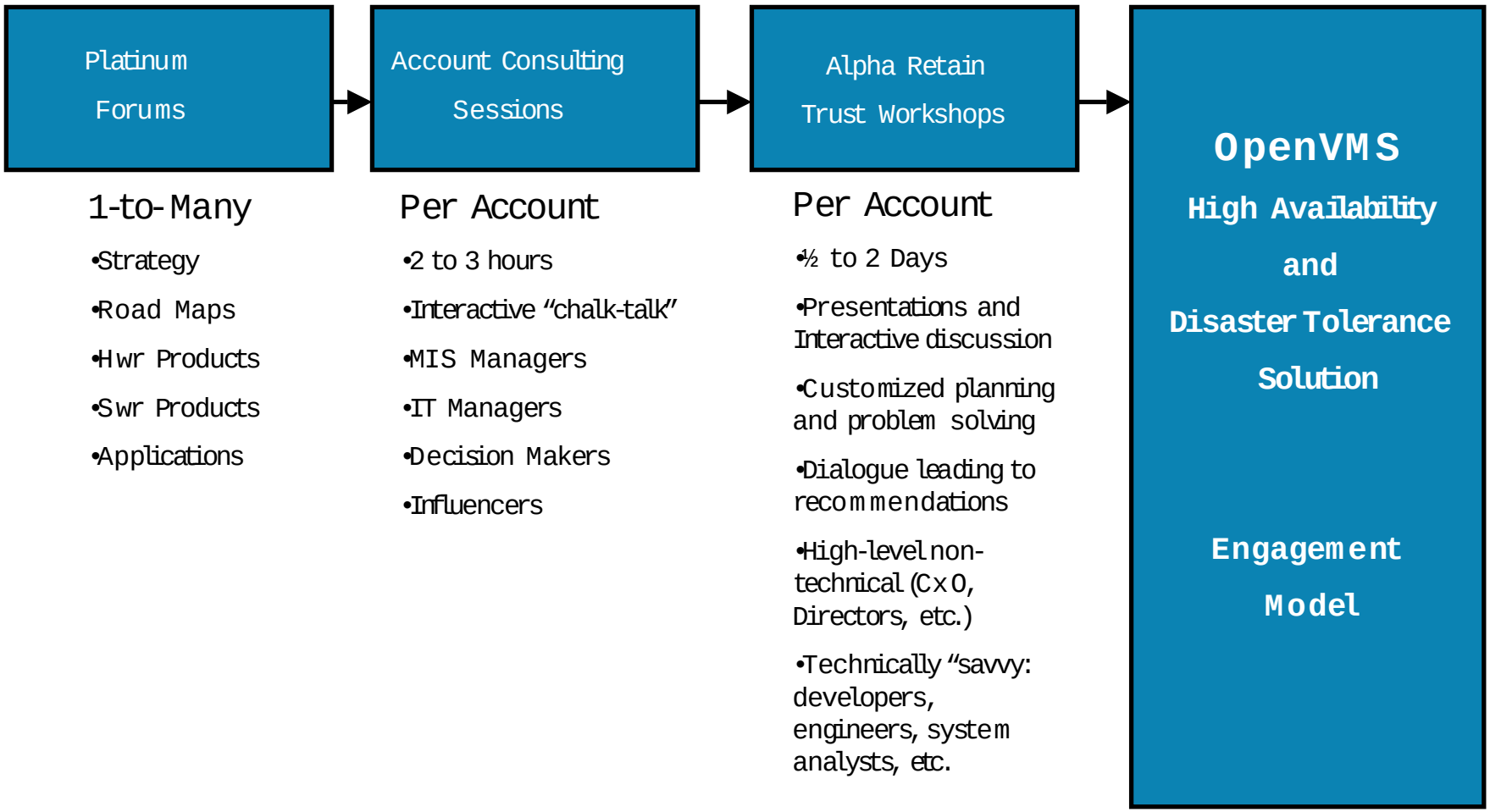
- Customer wants to move a mission critical system from one town to another
  - Lower real-estate costs
  - Lower service costs
  - Lower profile location – less susceptible to undesirable interest

- If the system is a OpenVMS Cluster (especially a DT cluster) we can move the system with no down-time!

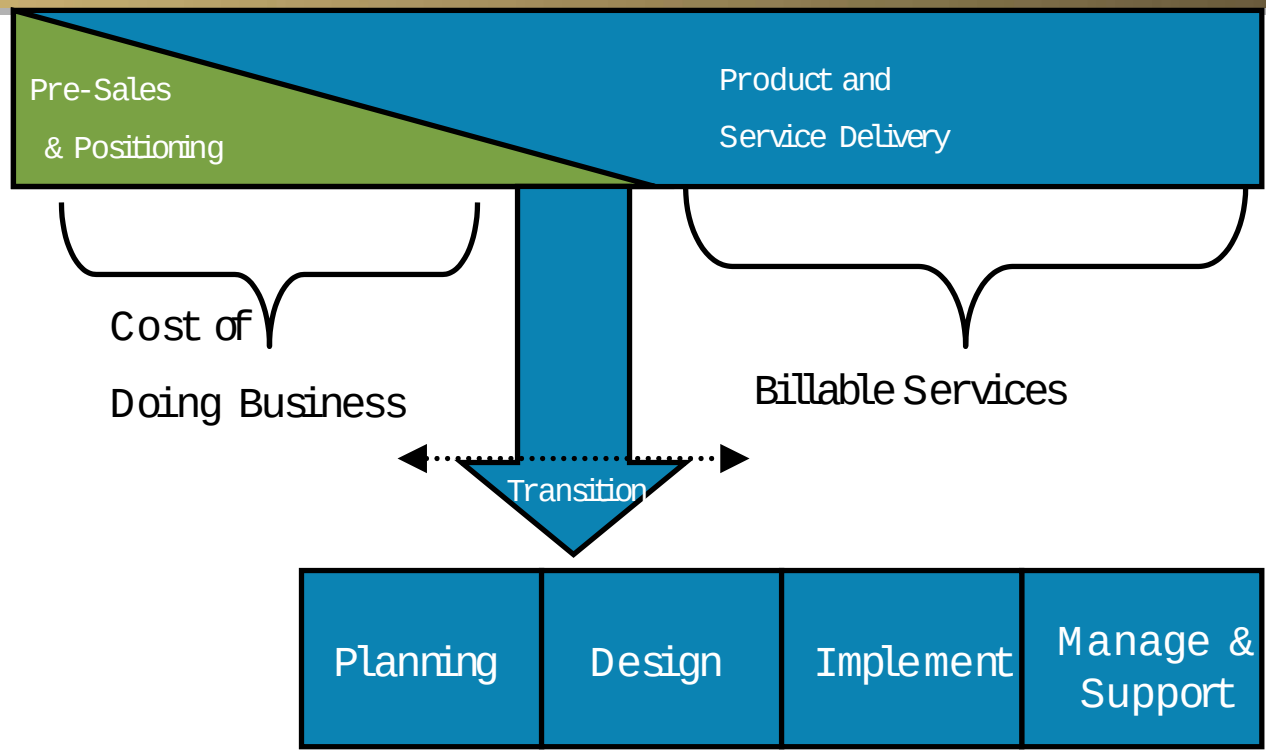
How to move a system with no downtime



Alpha Retain Trust Program "Umbrella"



every service provider's dilemma: setting expectations...



Key Issues

- How much will it cost to do this?
- What is the cost impact of a single disaster?
- How long will it take to implement DT?
- What resources will I need to commit?

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Case Study: Commerzbank AG North America 9/11/2001

Mr. W. Boensch
EVP / North America Management

Mr. G. Batan
VP / Systems and IT

Commerzbank AG NY Branch

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Agenda

- Who We Are
- What We Do
- Our Business Continuity Environment
- Our Share of Disasters
- The Unthinkable Disaster
- The Aftermath
- What worked for us
- Things to Improve / Lessons Learned
- Final Thoughts on Technology
- Final Thoughts on Business Continuity
- Questions

Who We Are

- Global Entity and Major Financial Institution with Head Office located in Frankfurt, Germany
- Total Assets – 400 billion Euros
- 4 US Branches – New York, Chicago, Los Angeles and Atlanta
- 35,000 employees world-wide, with close to 400 in North America

What We Do

- Commerzbank North America is in the wholesale banking business with special focus on relationships:
  - Corporate Banking:
    - Syndications
    - Secondary Markets
  - Specialists:
    - Energy/Utilities
    - Financial Institutions
    - Public Finance
    - Real Estate
    - Structured Finance
  - Trading and Treasury
  - USD Clearing

Business Continuity Planning

Preparing for a Disaster

Our Business Continuity Environment

The Facility

- Before 1995 we subscribed to a Disaster Recovery Facility
- After 1995 we acquired our own Business Continuity / Business Contingency Facility

Our Business Continuity Environment

Primary Site

Each **ESA12000** consists of
2 HSG80 controllers
3 BA370's daisy chained
2 Front & 1 Rear

Total of 72 slots each cabinet

Production data

Production data

GS160 with two hardware partitions and four galaxy VMS instances

WAN
CISCO
SWITCHES
VIA
one DS-3

GS160 with two hardware partitions and four galaxy VMS instances

Back-Up Site

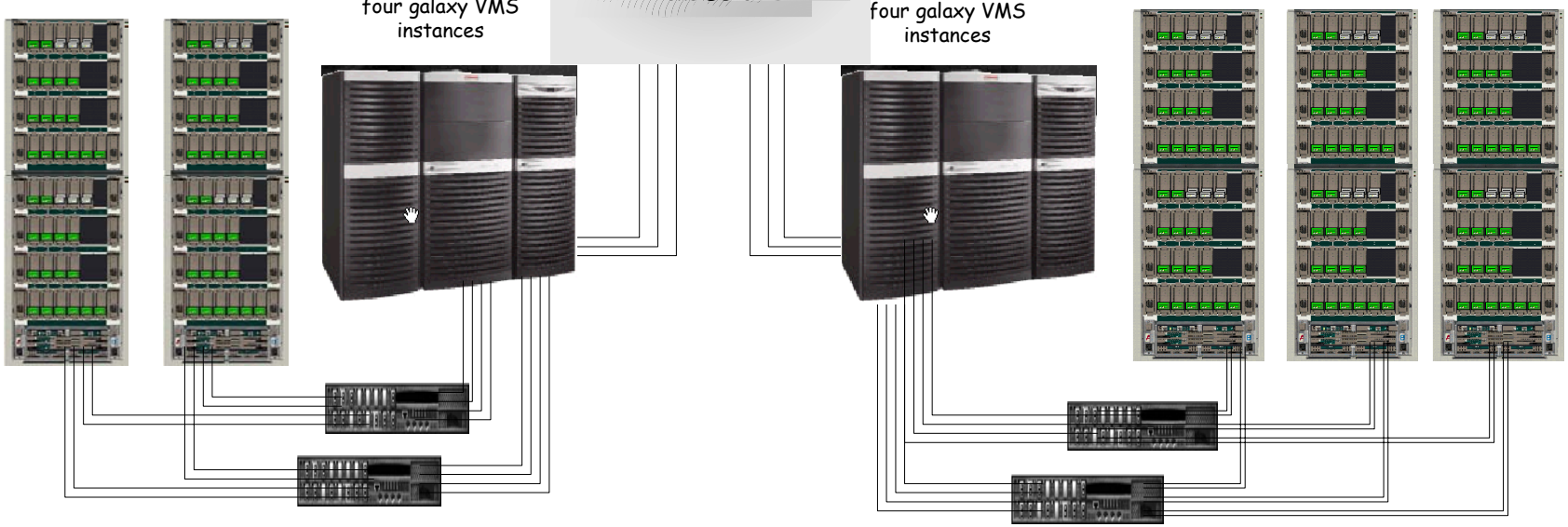
Each **ESA12000** consists of
2 HSG80 controllers
3 BA370's daisy chained
2 Front & 1 Rear

Total of 72 slots each cabinet

Replicated Production data

Replicated Production data

Test data



2 - 16 port fibre switches
8 - system connections
4 - HSG80 connections

2 - 16 port fibre switches
8 - system connections
4 - HSG80 connections

Our Business Continuity Environment

Alpha Server GS160 and OpenVMS Galaxy software

Hard Partition 0

Server1
Instance 1
2-731 Mhz
CPUs
3-GB memory

Server2
Instance 2
2-731 Mhz
CPUs
4-GB memory

Within a hard partition:
CPUs can be moved between instances
1 GB of shared memory between instances

Hard Partition 1

Server 3
Instance 1
2-731 MhzCPUs
4-GB memory

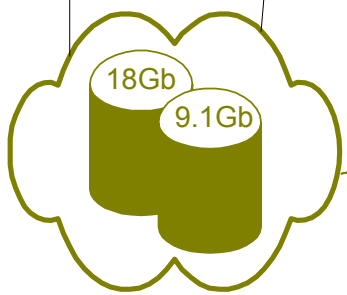
Server 4
Instance 2
2-731 Mhz
CPUs
3-GB memory

Within a hard partition:
CPUs can be moved between instances
1 GB of shared memory between instances

SWITCH

SWITCH

SAN Fiber Switches
Provide 200MB of dual redundant bandwith from *SAN Storage Farm* to each connected instance in the GS 160



SAN Storage Farm
Storage Farm consist of controllers and disk arrays. Storage Farm for VMS is made up of 18GB, and 9.1GB disk arrays totaling **973GB**

Our Business Continuity Environment

Uses Under Normal Conditions

- An Alternate Site for Business Users:
  - Off Site Business Meeting
  - Training Facility
- Disaster Recovery Simulation Testing
- Conduct Mandatory Testing:
  - New York Clearing House
  - Federal Reserve
- Systems, Applications Network Testing
- Program Development and Testing

Our Share of Disasters

through the years...

Our Share of Disasters

First Interstate Building Fire: May 5, 1988

- Commerzbank AG, Los Angeles Branch was located on 36th floor
- Fire started several floors below but was contained within 4 floors
- Smoke damaged our premises
- Bank of America in L.A. provided work area for most of our staff
- A few Employees were flown to the New York Branch

Our Share of Disasters

Chicago Flood: April 13, 1992

- Commerzbank Chicago was on 46th Floor of Mid Continental Plaza
- Break in the retaining wall of Chicago River
- 9 building basements affected including Mid Continental Plaza/Mercantile exchange
- The building had no electricity and was inaccessible for a day
- Back office staff flown to New York to continue operations

Our Share of Disasters

WTC Bombing: February 26, 1993

- Commerzbank Capital Market Corporation (CCMC) was on 40th Floor of WTC, Tower 1
- Terrorists planted explosives in the WTC parking garage
- Relocated over 60 CCMC employees to the bank at WFC and were fully operational within one day
- CCMC continued operations from bank's premises for several years

Our Share of Disasters

NY Metro Blizzard: January 7, 1996

- A record 20.6” snow fell in tri-state and New York metropolitan area making most roads impassable. Only emergency vehicles allowed on the road for clean up.
- Used dial-up modems from home to monitor the systems, execute CHIPS and Fed wire payments
- Accommodated 16 member staff to work from home on critical processes

The Unthinkable Disaster

World Trade Center Attack

September 11, 2001

The Unthinkable Disaster

8:45 am EST
American Airlines Flight 11
crashes into North tower

9:03 am EST
United Airlines Flight 175
crashes into South tower

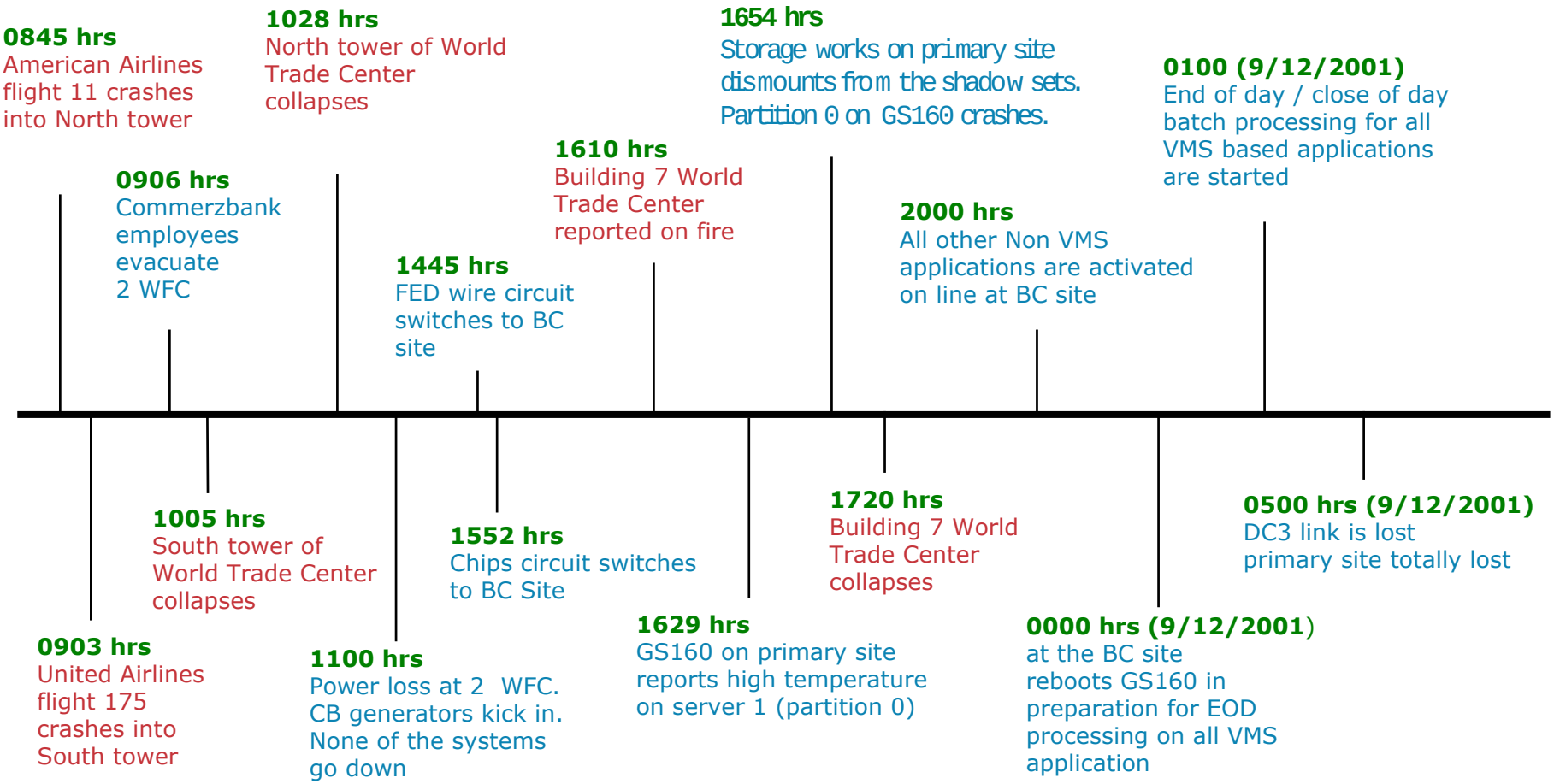
The Unthinkable Disaster

The Unthinkable Disaster

The Unthinkable Disaster

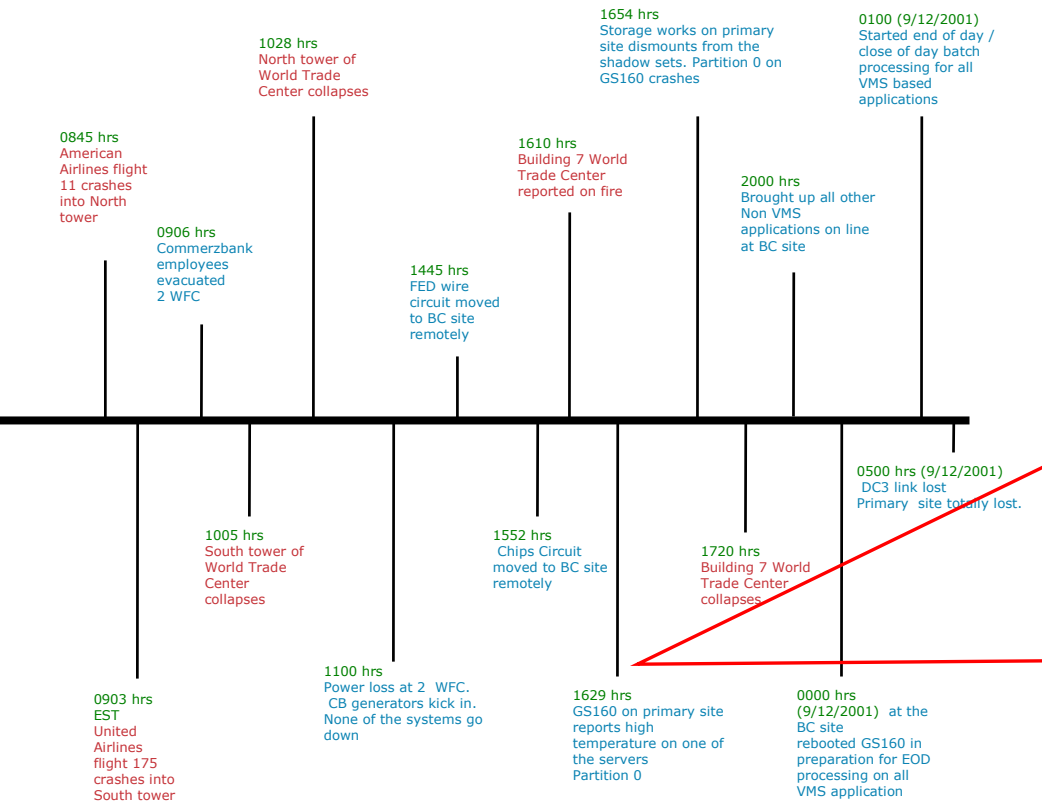
The Unthinkable Disaster

September 11 Commerzbank Time Clock



The Unthinkable Disaster

September 11 Commerzbank Time Clock



16:29

System error log reports:
"QBB temp in yellow zones"
(yellow means 37^0C or 98.6^0F and red zones (40^0 C or 104^0F)
Console log reports:
%SMHANDLER-W-TEMP, warning temperature exceeded

High temperature report was on server 1 (partition 0)

Device errors were recorded on the error log

The Unthinkable Disaster

September 11 Commerzbank Time Clock

16:54
Disk drives go to mount verify.
57 disks (2.25 Terabytes)
get dismounted one after another

16:54:54
Last time stamp on console log

16:57:34
Lost cluster member
- Partition 0 crashes
- Partition 1 stays up

17:06:20
Error log reports high temperature warning on Server 8 (Partition 0)

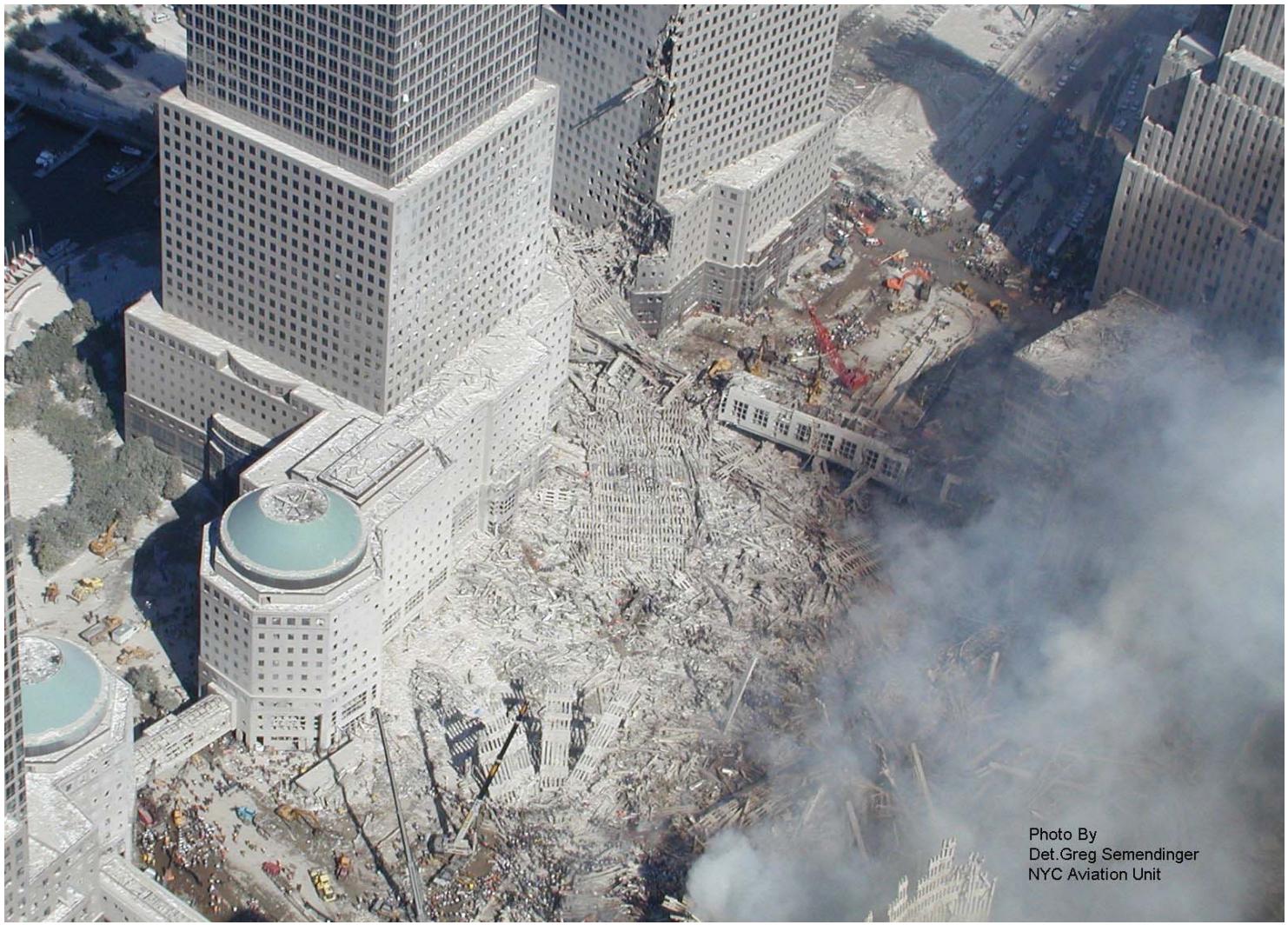
17:06:20
Last time stamp on error log

The Unthinkable Disaster

The Unthinkable Disaster

The Unthinkable Disaster

The Unthinkable Disaster



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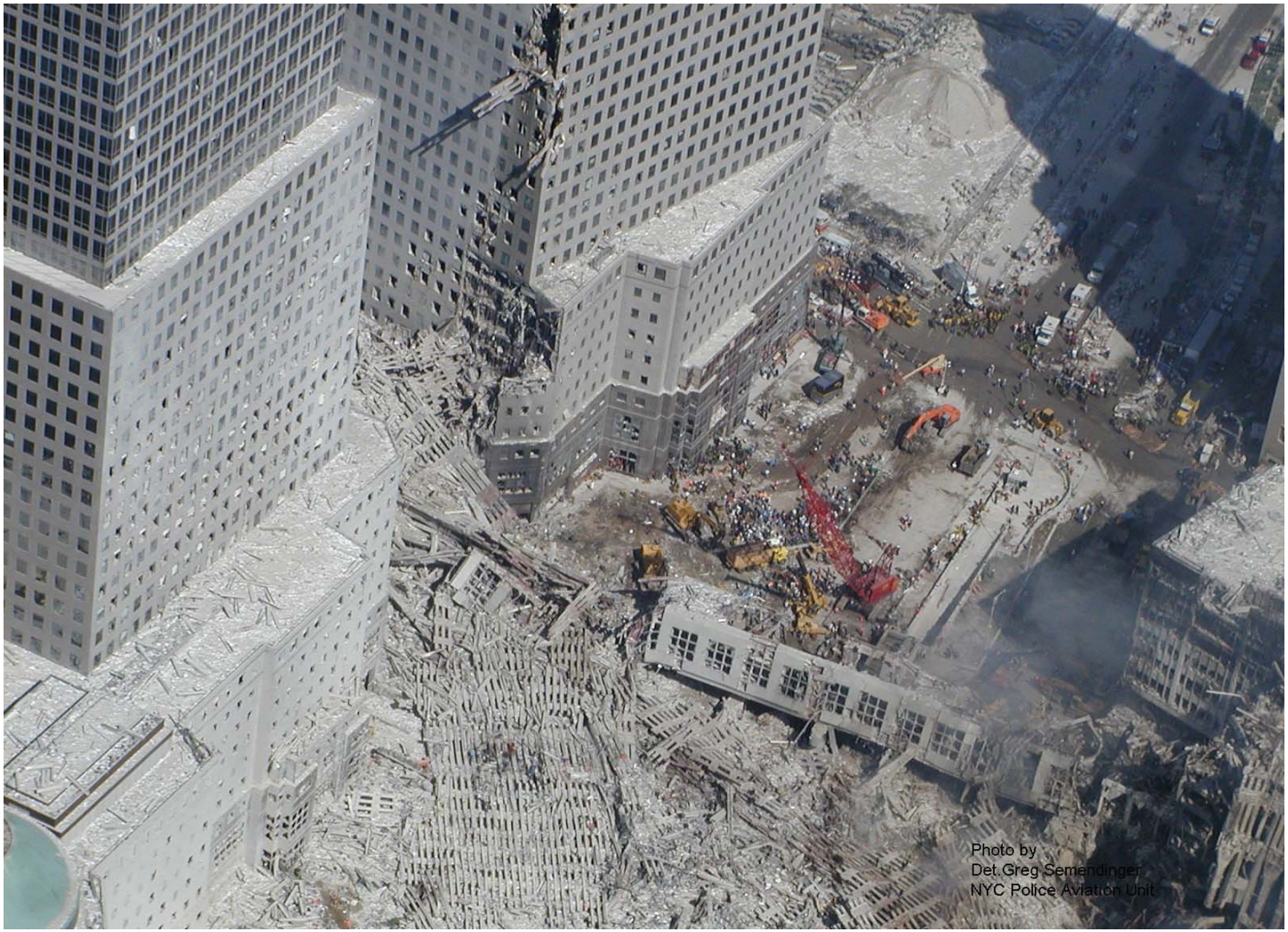
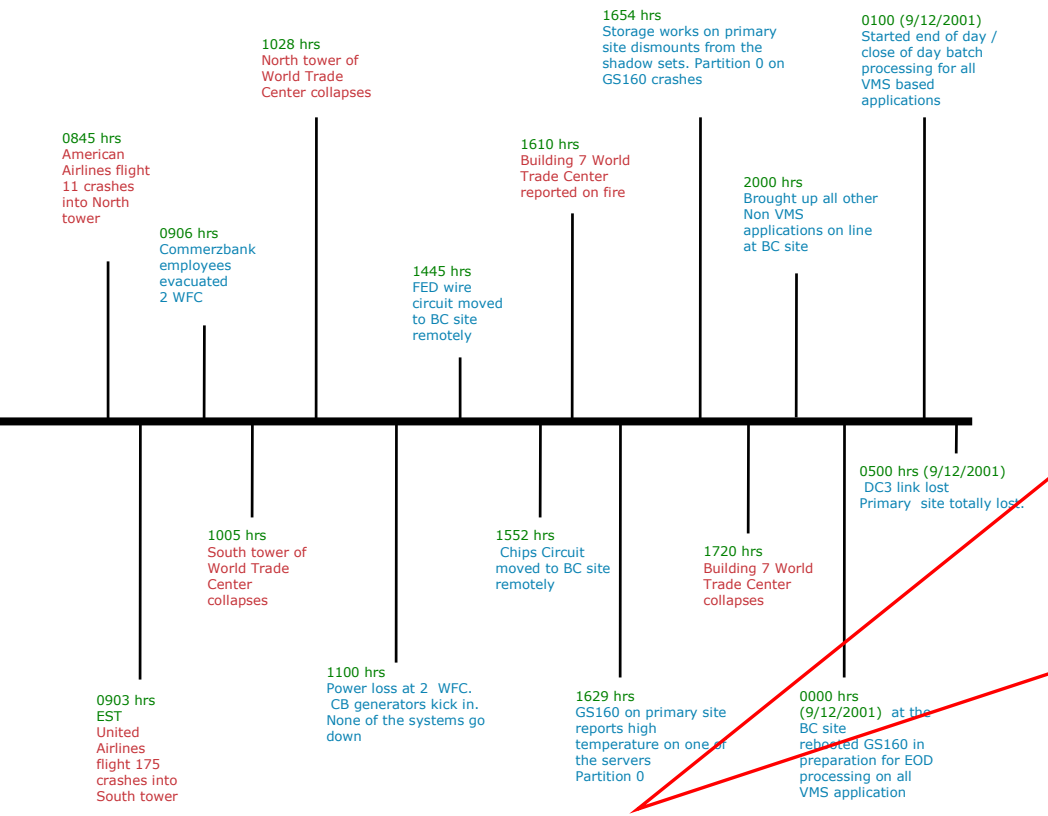


The Unthinkable Disaster

The Aftermath



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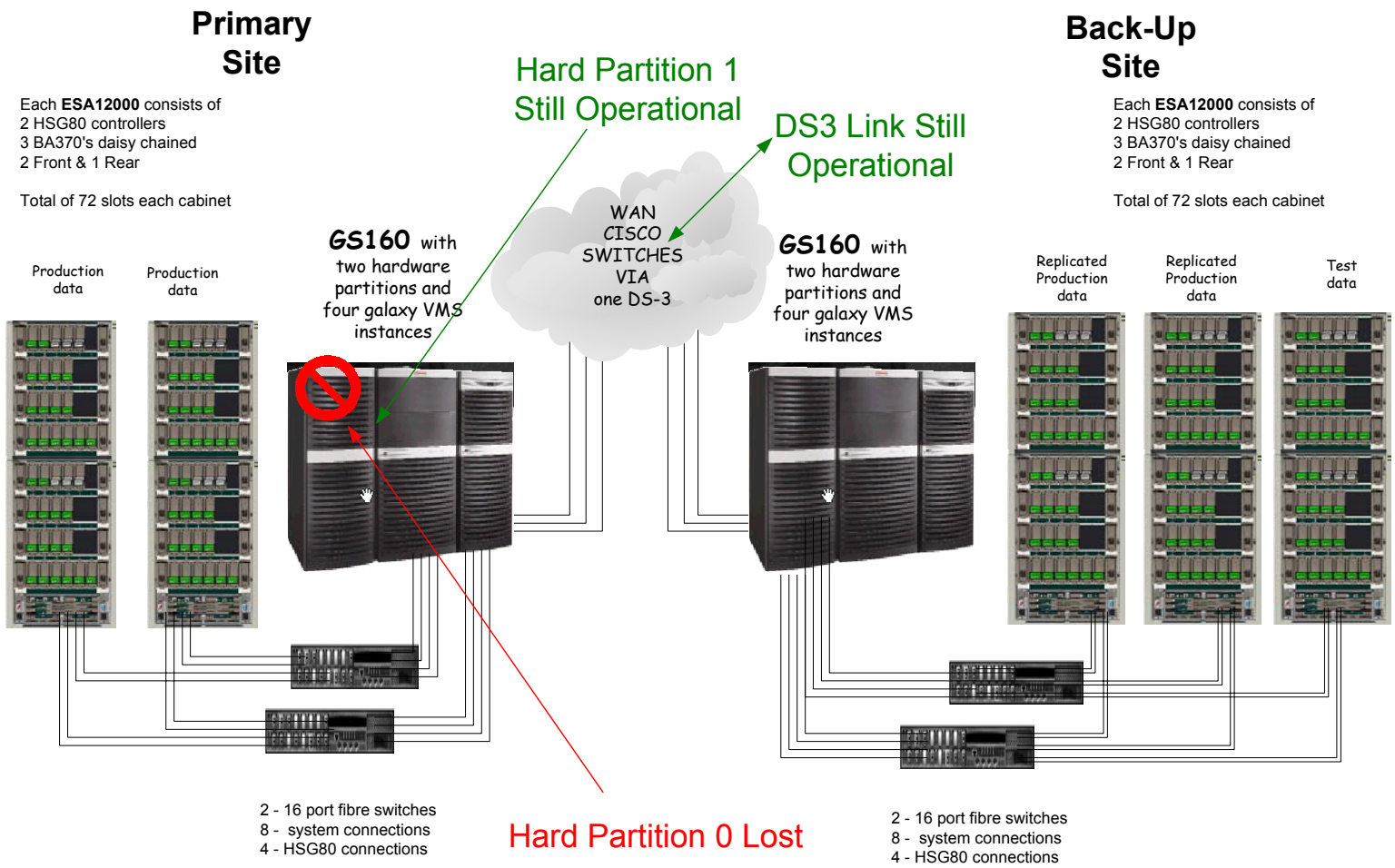
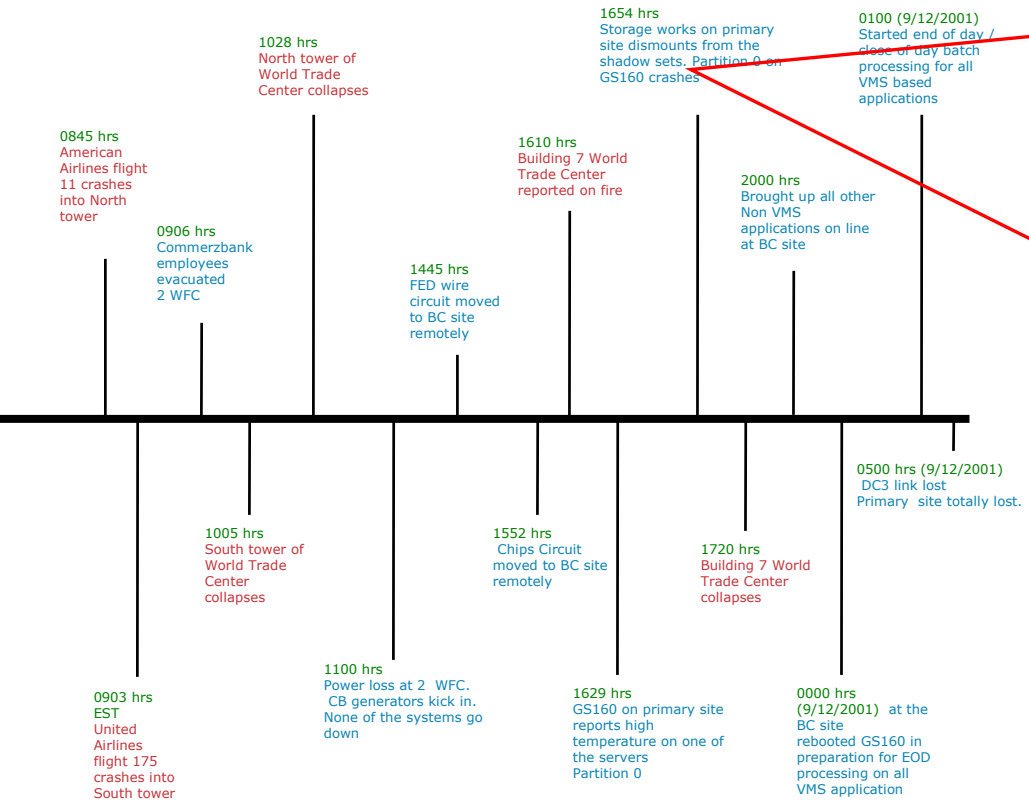
GS160 Partition 0 crashed

The Aftermath

GS160 Partition Crashes at 4:29 pm 9 / 11 /2001



The Aftermath



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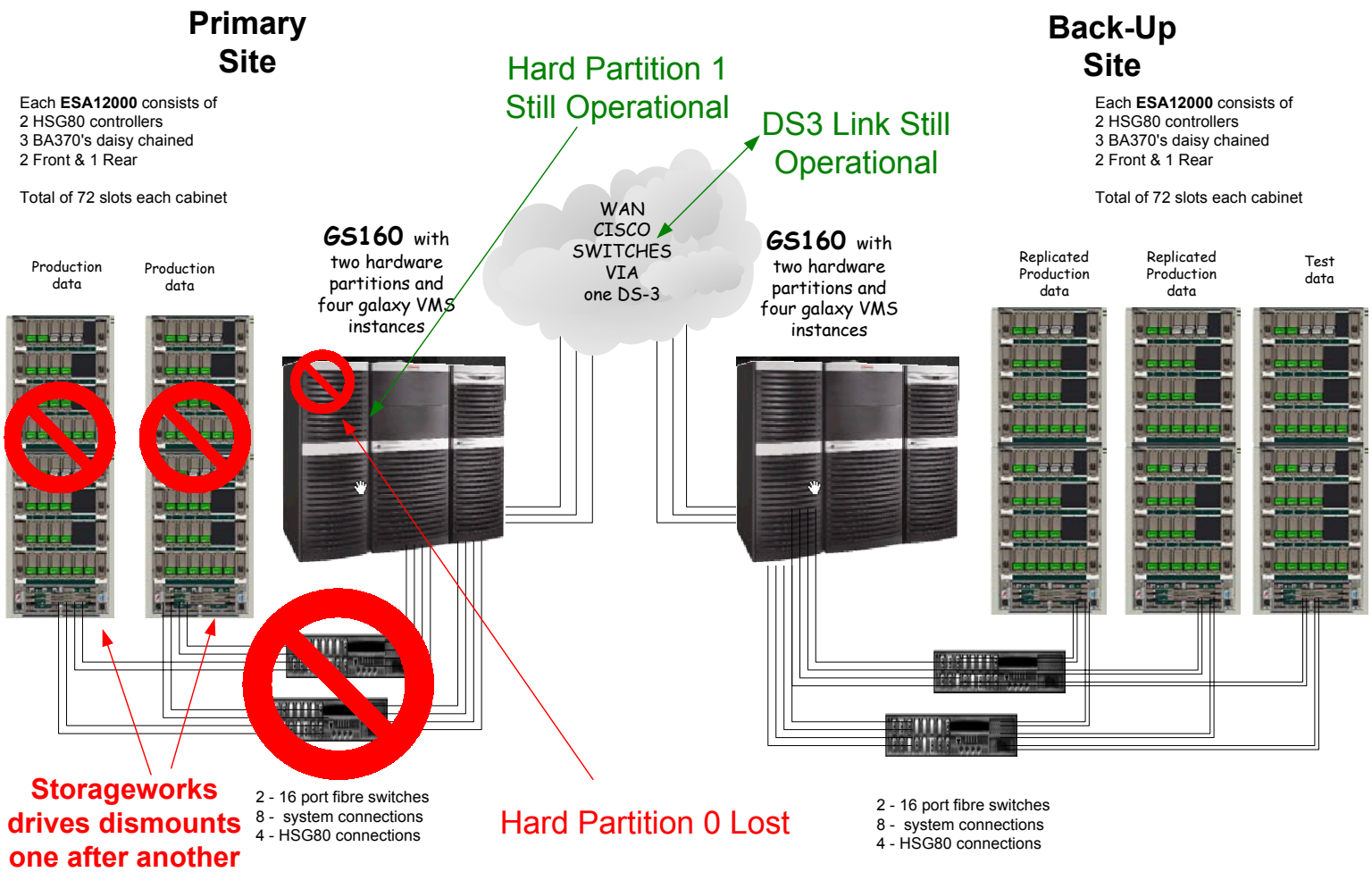
All local volume shadowed disk drives exit the shadow set

The Aftermath

Shadowed Disks Exit at 4:54 pm 9 / 11 /2001



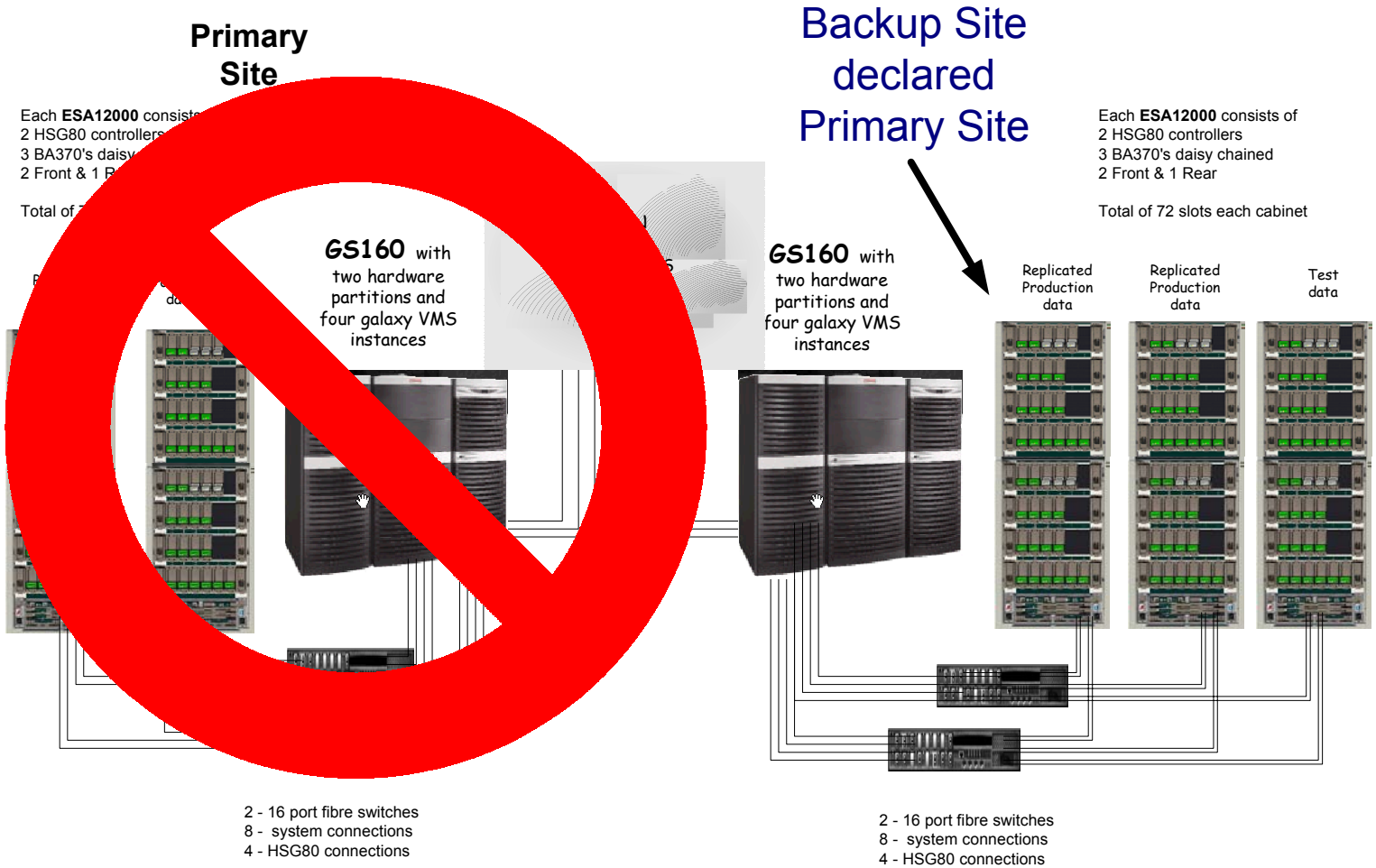
The Aftermath

OpenVMS System Status after end of business day

- The GS160 at Primary Site was shutdown and the GS160 at BC Site was initialized at 22:15 and brought up as production together with the remote shadowed disk drives
- Started end of day batch procedures for production applications
- Business Continuity Site becomes the Primary Site

The Aftermath

Business Continuity Site Declared as Primary Site



What Worked For Us

- Business Continuity Plan that is practical and tested:
  - Developed, tested and implemented a comprehensive BCP
  - Involved all business users in testing of the plan
  - Conducted regular failover and fallback tests on applications, systems and network connectivity:
    - Simulating and testing business contingency situations on a regular basis
- Proper Environment in place at Primary Site:
  - UPS
  - Generator
  - Cooling tower

What Worked For Us

- We own our Business Continuity Facility:
  - 25% of business users accommodated by the Business Continuity Facility (100 seats)
  - 70% of business users provided with short term lease space, plus accommodation by our subsidiary's facility
  - 5% of business users accessed the bank via secured dial in and VPN connections from home

What Worked For Us

HP WORLD 2003
Solutions and Technology Conference & Expo

Appropriate Technology to Support Business Continuity

- Systems are locally and remotely clustered:
  - Redundant systems for critical applications DCF & BCF are both equipped with the following:
    - GS160 Alpha servers

      Hardware partitioning — Shared memory

      Dynamic CPU allocation — OpenVMS 7.2-1H1

- Critical disk drives are locally and remotely mirrored:
  - ESA12000 Storage Works (2.25 Terabytes):
    - 57 disk drives (assortment of 9, 18 and 36 GB drives):

      Configured as raid sets for protection and performance:

      Raid 0 (stripes) — JBOD (just bunch of drives)-standalone drives

      Raid 1 (mirroring) — Raid 5 (stripe with parity)

What Worked For Us

- High speed network links that enabled us to sustain volume shadowing of over 1 terabyte of data
- Controls and monitors are in place to constantly check status of shadow set members and remote cluster servers to ascertain uptime
- 24/7/365 monitoring of business continuity environment by means of automated notification by pagers and e-mail to support staff
- Business partners (like HPQ) and equipment vendors, who where on hand, ready and willing to help in any way

What Worked For Us

- Employees that are dedicated, unrelenting, knowledgeable and committed to keep the business going
- Employees that remained focused during a crisis, even while dealing with mental and physical hardships
- A highly motivated staff that took it upon itself to continue the business and recover with minimal to no impact
- Strong leaders that embraced a team spirited approach in handling the crisis (the thinking was “ We can handle this together”)

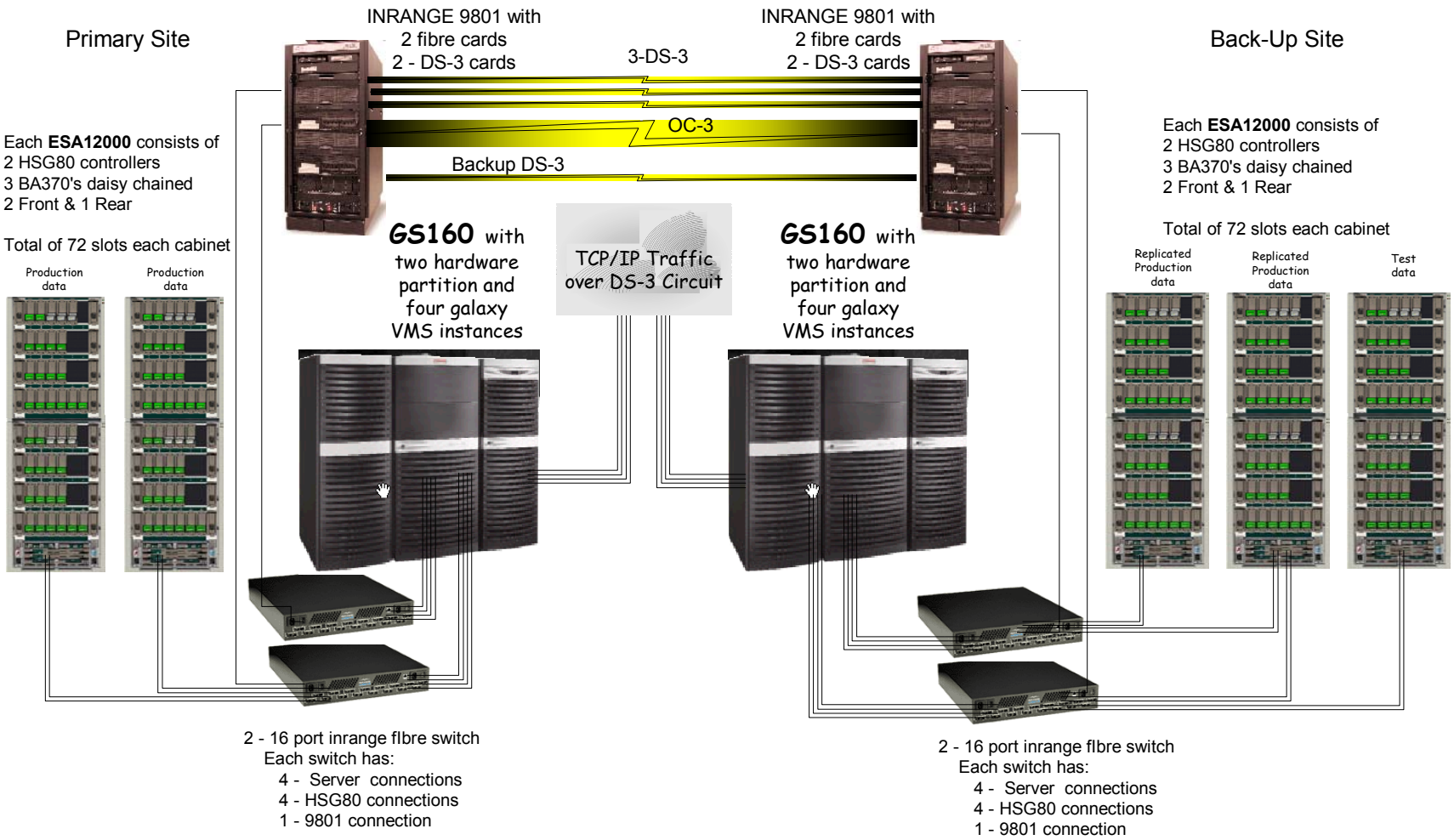
Things to Improve / Lessons Learned

- Speed Up the Volume Shadowing Process to the BC Facility by using Data Compression Technology:
  - Speed up data synchronization (2.25TB reduced from days to hours to sync)
- Replication of Office Automation Applications to BC site:
  - E-mail is a very valuable tool (We had to rebuild and restore e-mails from tape instead of just bringing them up)
  - Fax Server is another valuable tool (We had to use the traditional fax tools to send and receive because our Enterprise fax software was not replicated)

Things to Improve / Lessons Learned

- Plan and design a secured VPN solution to handle at least 100 staff:
  - Dial up connection is slow and ISDN is expensive and both solutions are administrator intensive
- Manage our Centrex system: ability to program phone system rather than depend on a vendor:
  - We were dependent on the Centrex system (TelCo dependent)

Enhancing System Configuration



Final Thoughts on Technology

- Open VMS and the Alpha GS160 are an excellent technology combination. Both are secure and robust.

- Galaxy Software:
  - Use partitioning, Dynamic CPU allocation and shared memory to optimize hardware investment

- Volume Shadowing Software:
  - Mirror all business critical applications

Final Thoughts on Business Continuity

- Have your own Business Continuity Facility

  Note: NOT a Disaster Recovery Site

- Make sure the Business Continuity Plan works:
  - Test, Test, and re-Test again ! ! !

World Financial Center Today

Questions

Interex, Encompass and HP bring you a powerful new HP World.