innovative storage management

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network storage solutions
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agenda

- hp's vision & strategy
- introduction
  - storage management challenges
  - the goodness of networked storage – it's about the plumbing
- storage management…re-defined
  - management integration
  - management heterogeneity - the open SAN
  - management cooperation and unification
  - management simplification with virtualization
  - enabled networked storage

hp storage beliefs

our vision

- storage is a utility service to the enterprise
- the enterprise storage utility delivers the right information to anyone, anytime, anywhere

our strategy

- streamline operations, accelerate time-to-market, leverage your information
- focus on network storage solutions
- leverage our ability to integrate with servers and others for complete infrastructure solutions

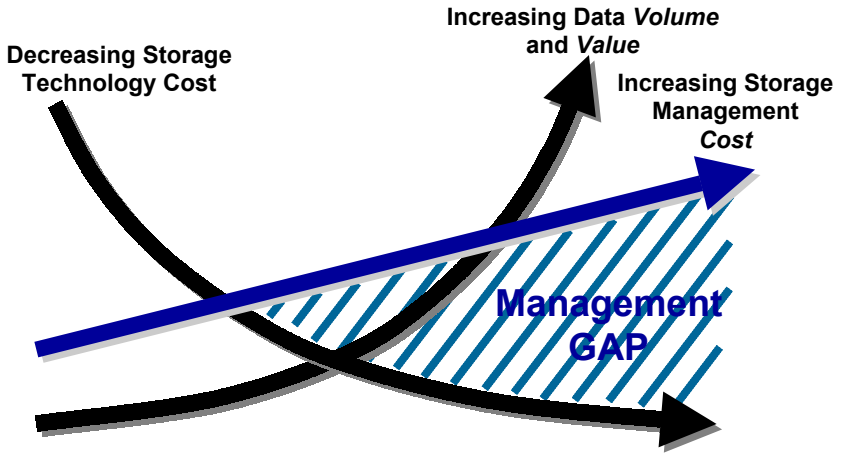
hp OpenView storage software

vision

- develop innovative, integrated storage management software products
- enable always-on storage utility to be realized
- deliver measurable business value eliminating complexity
- minimize time-to-deployment
- reduce TCO enabling superior service levels for data availability, access and preservation

data growth brings challenges

- business increasingly demands more data
- greater reliance on data demands better access
  - greater resource sharing
  - higher performance
  - less application downtime
- business reality drives greater efficiencies
  - capacity utilization
  - improved management



meeting challenges brings challenges

management software for :

backup/recovery

- centralize operations
- disk based copies to tape
- data replication

storage resource management

- centralize configuration mgt
- streamlines fault identification/ remediation

virtualization

addresses :

data protection

- standardizes process
- reduces backup windows
- reduces downtime possibility

capacity utilization

- simplifies provisioning
- improves data availability

data mobility/optimized performance

how can use of these tools and others be coordinated?

the rate of growth is relentless

how much data next year?

- today's best storage administrators (SA) can manage 5TB – 10TB each
- if the world adds 400PB of disk by next year

and

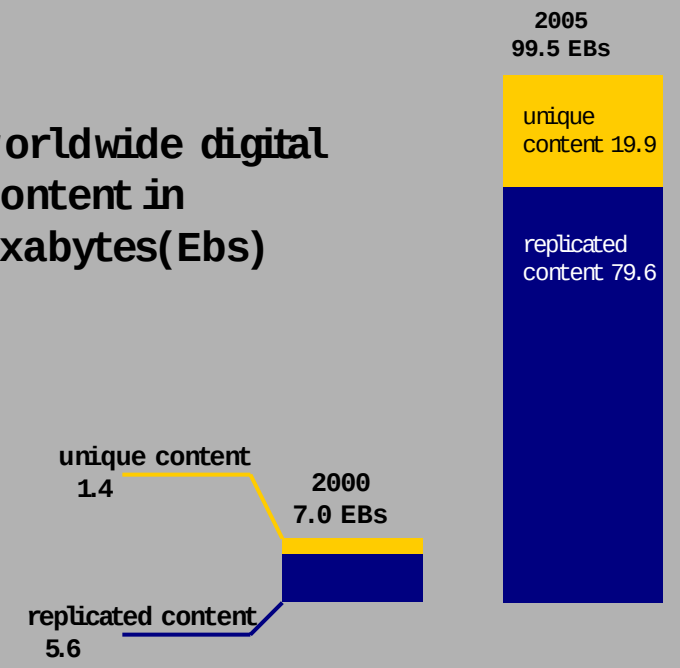
- if there is an improvement in storage management per SA from 10TB to 25TB (150% gain)

→ still need 5,000 new SA's to keep even

-Bob Zimmerman/Anders Lofgren,
Giga, June 13, 2002

how much data in three years?

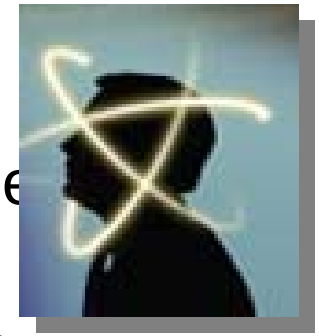
worldwide digital content in exabytes(Ebs)



Source: UC - Berkley

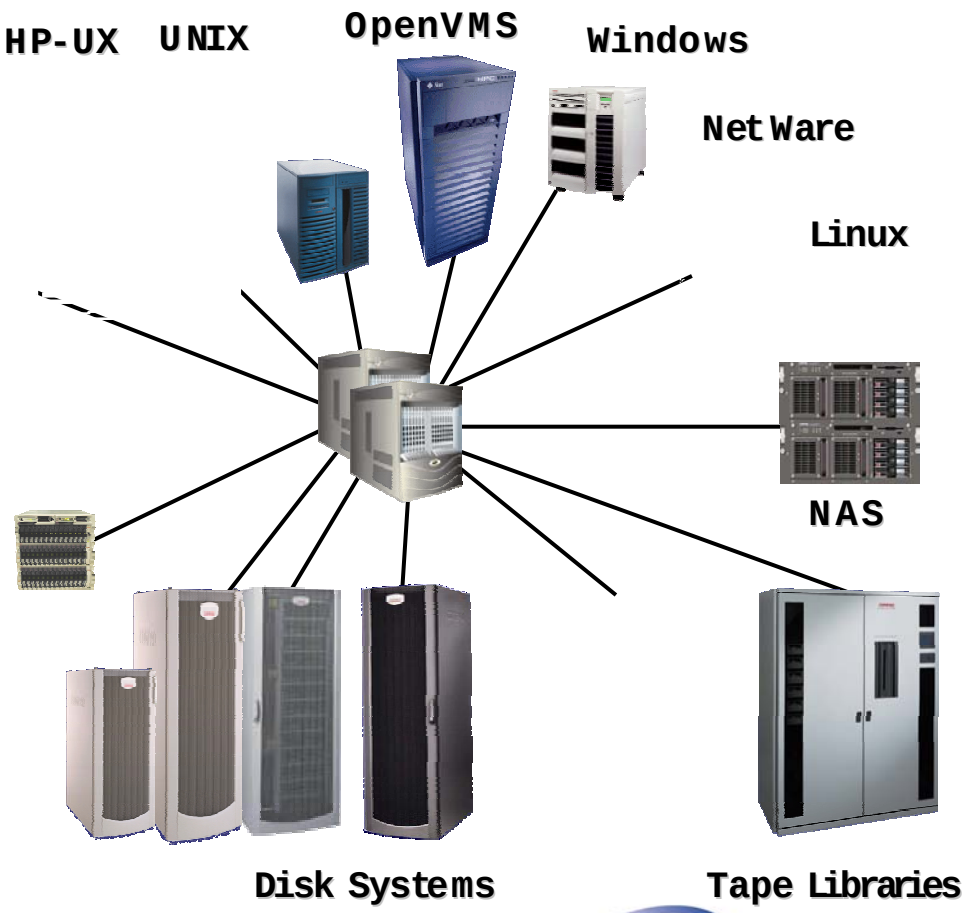
storage management challenges

- manage more storage for more servers
  - with same or fewer people and funds
- protect/restore data less obtrusively
  - smaller backup window, faster restore time
  - continuous uptime (business continuity)
- simplify the management environment
- integrate multiple management functions
- preserve investment by combined use of heterogeneous storage devices
- be prepared to scale entire activity dramatically

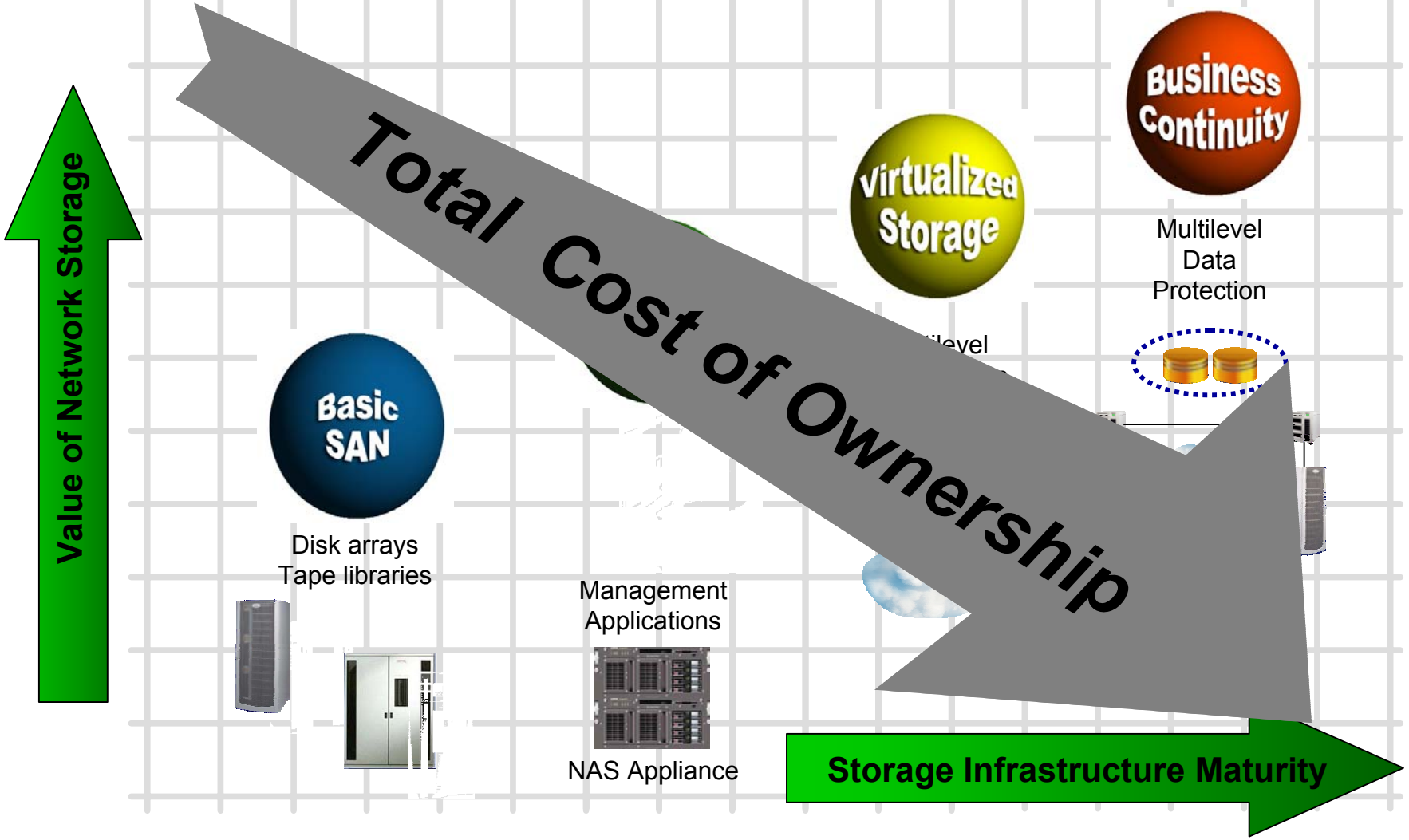


SAN: scalable, flexible, versatile foundation

- availability
  - to full redundancy
- performance
  - to GB/sec throughput
  - to millions of IO/sec
- capacity
  - GB to PB
- connectivity
  - hundreds of ports
- distance
  - meters to hundreds of kilometers



value of network storage grows



... by its extension of unified management

why the discontinuous jump in networked storage productivity?

after all – it's just different plumbing

isn't it?

let's consider the notion that

with networked storage …

it's all about being able to manage a lot of things at the same time.

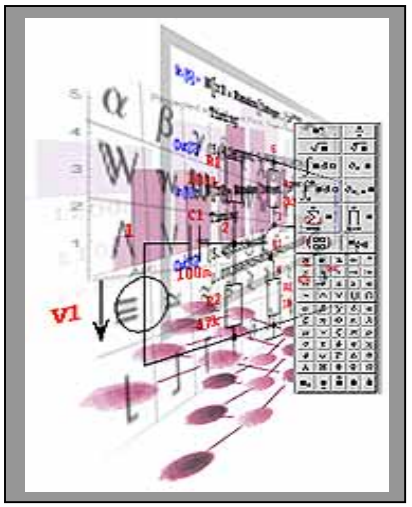
network-based management

- broadens reach of storage management to all networked storage and servers
- simplifies deployment of storage management and maintenance tasks
- integrates and centralizes storage management and automation services
- reduces storage management costs

management integration

integrated storage management to allow you to:

- measure, monitor and troubleshoot across all the elements of your infrastructure:
  - network
  - system
  - application
  - storage devices



- view status and respond directly to events for:
  - fault response
  - performance assurance
  - service level management

storage management portfolio

system management

application management

network management

performance & resource mgmt

storage management

network storage management

data management

storage area management

discovery, topology, events/ alarms

assignment and access control

performance analysis, thresholds & reporting

capacity analysis, control, planning

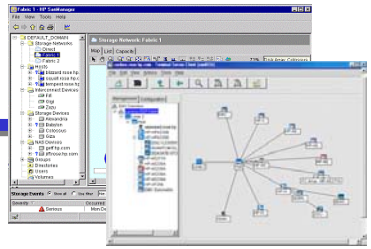
service levels, metering, charge back

data replication for remote mirroring

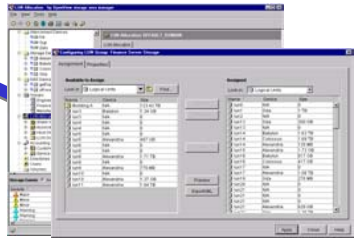
automated data protection and media mgmt

common management platform applications

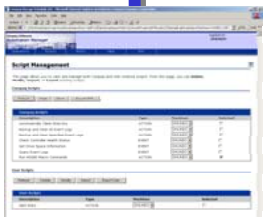
Device and usage
Monitoring and
administration



Device discovery,
SAN Visualization,
Performance Management



Storage Provisioning

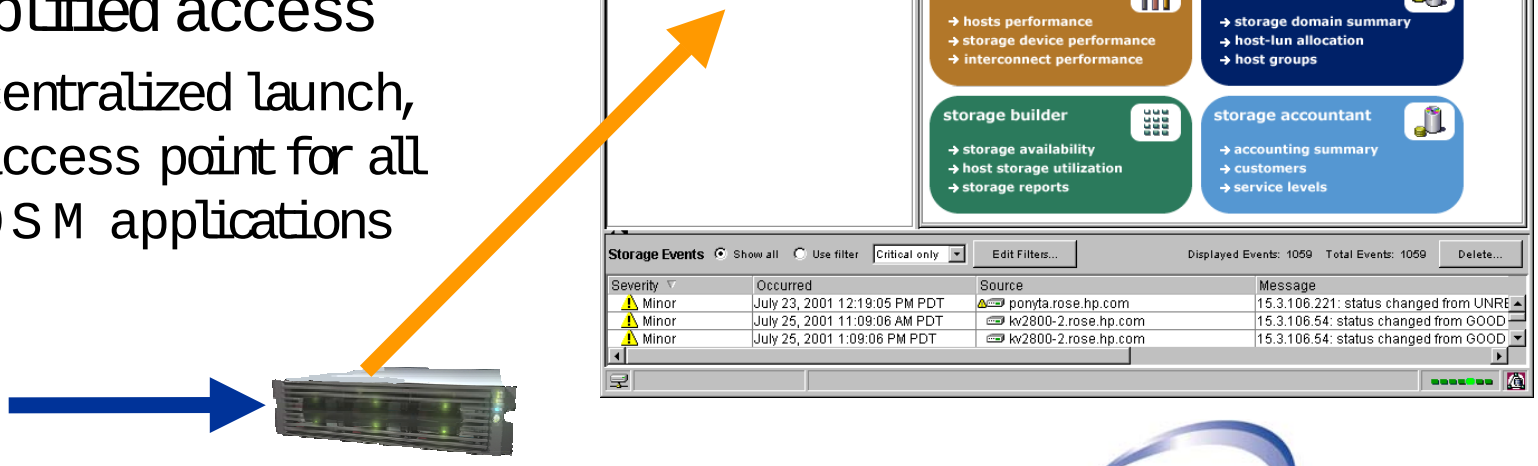


Policy based automation

Data Management
(Snapshots, global replication)

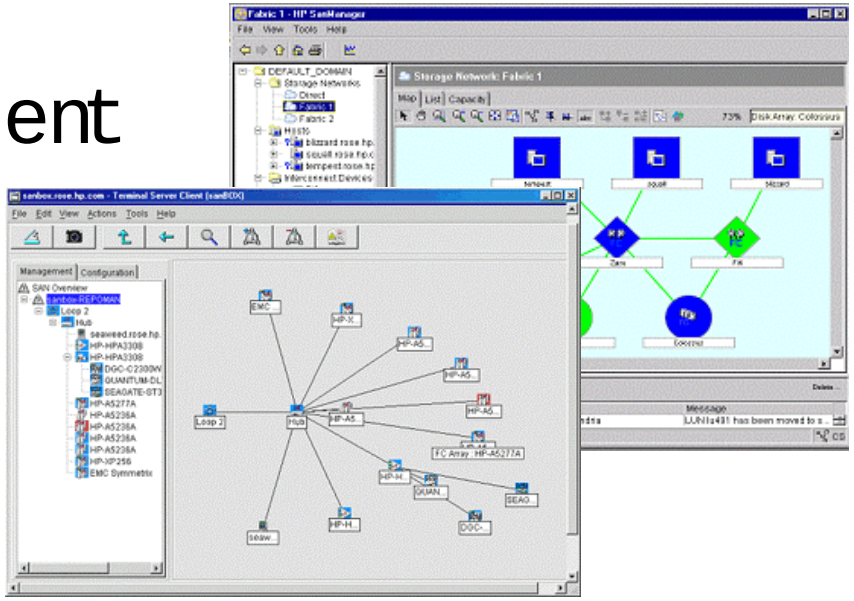
example: OpenView Storage Area Manager

- consolidated management
  - application configuration and installation
- simplified access
  - centralized launch, access point for all OSM applications



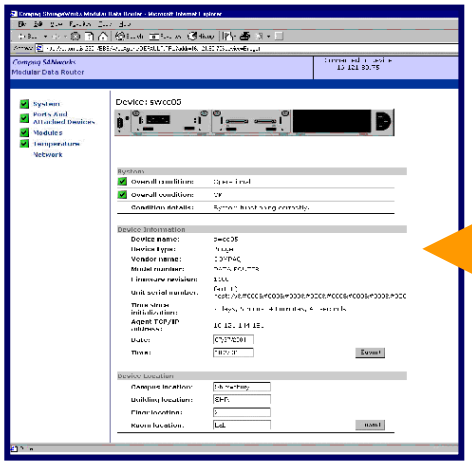
example: SAMS Node Manager

- SAN topology discovery and visualization
  - tree-view and topology map of devices and links
- configuration management
  - device management
    - drill-down for device information
    - access device configuration utilities

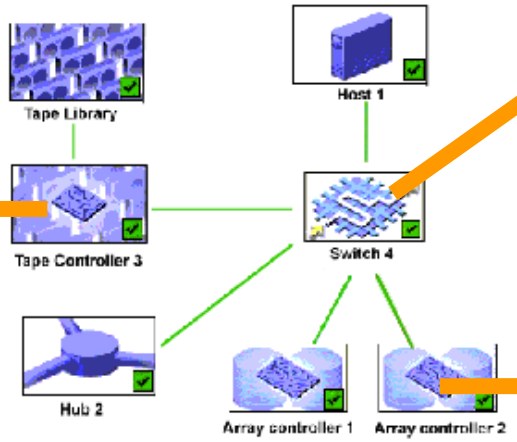


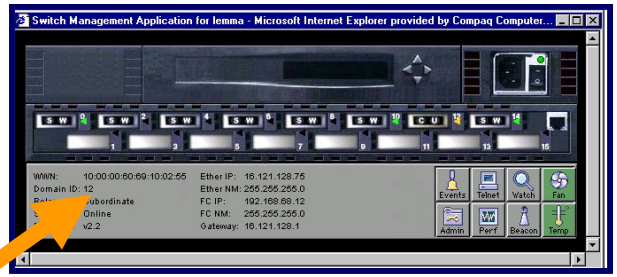
example: device management

device managers are launched from SAN visualization management interface

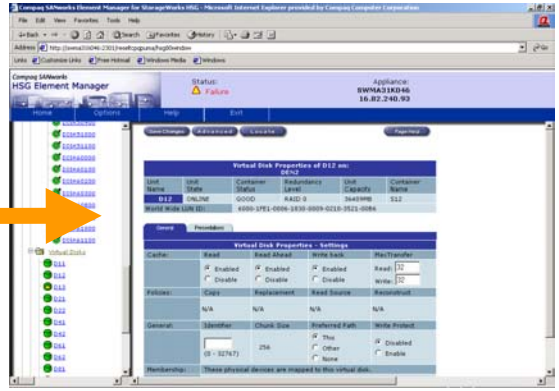


Tape Controller Element Manager





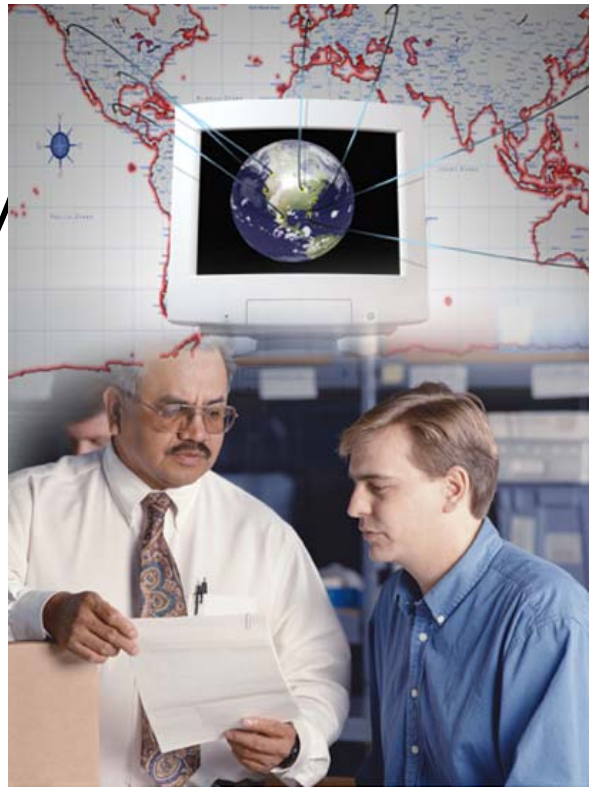
Switch Element Manager



Storage System Element Manager

management heterogeneity: the open SAN

- what's needed
  - greater storage heterogeneity in the SAN
  - unifying management
- how we get there
  - greater vendor cooperation
  - standards effort



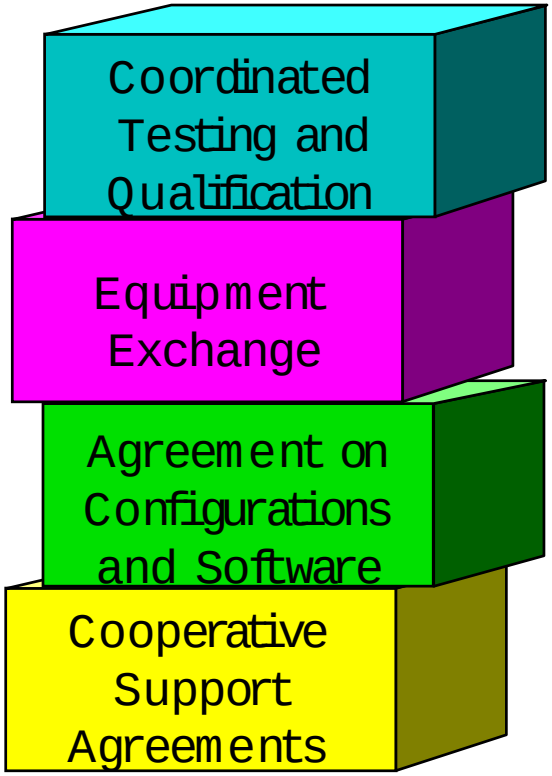
open SAN initiatives

- SNIA Supported Solutions Forum
  - Open SAN Supported Solutions
- SNIA Technology Center
- API exchanges amongst vendors
- device-independent SAN management
  - Bluefin

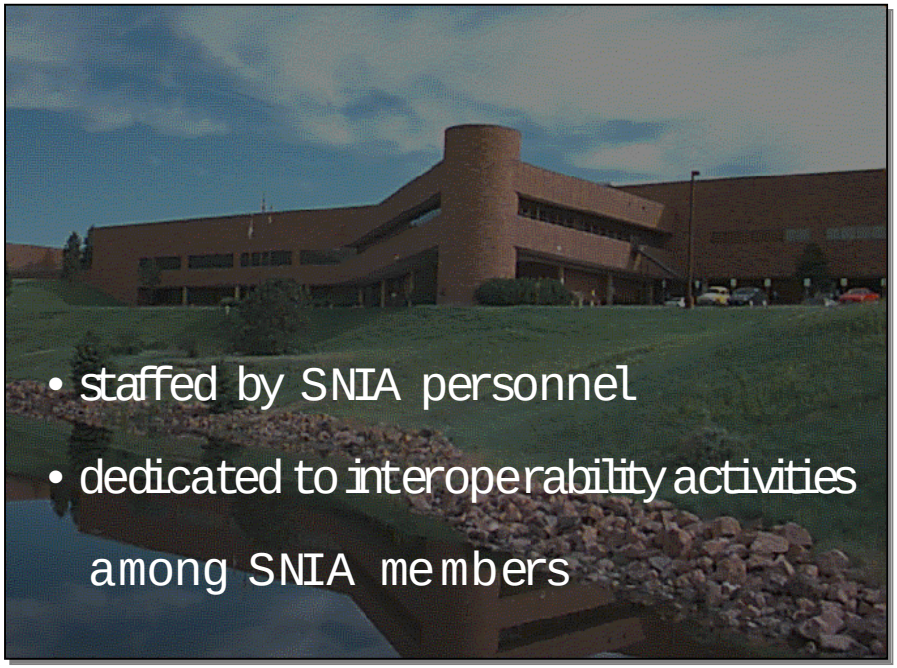
open SAN initiatives

SNIA Supported Solutions Forum

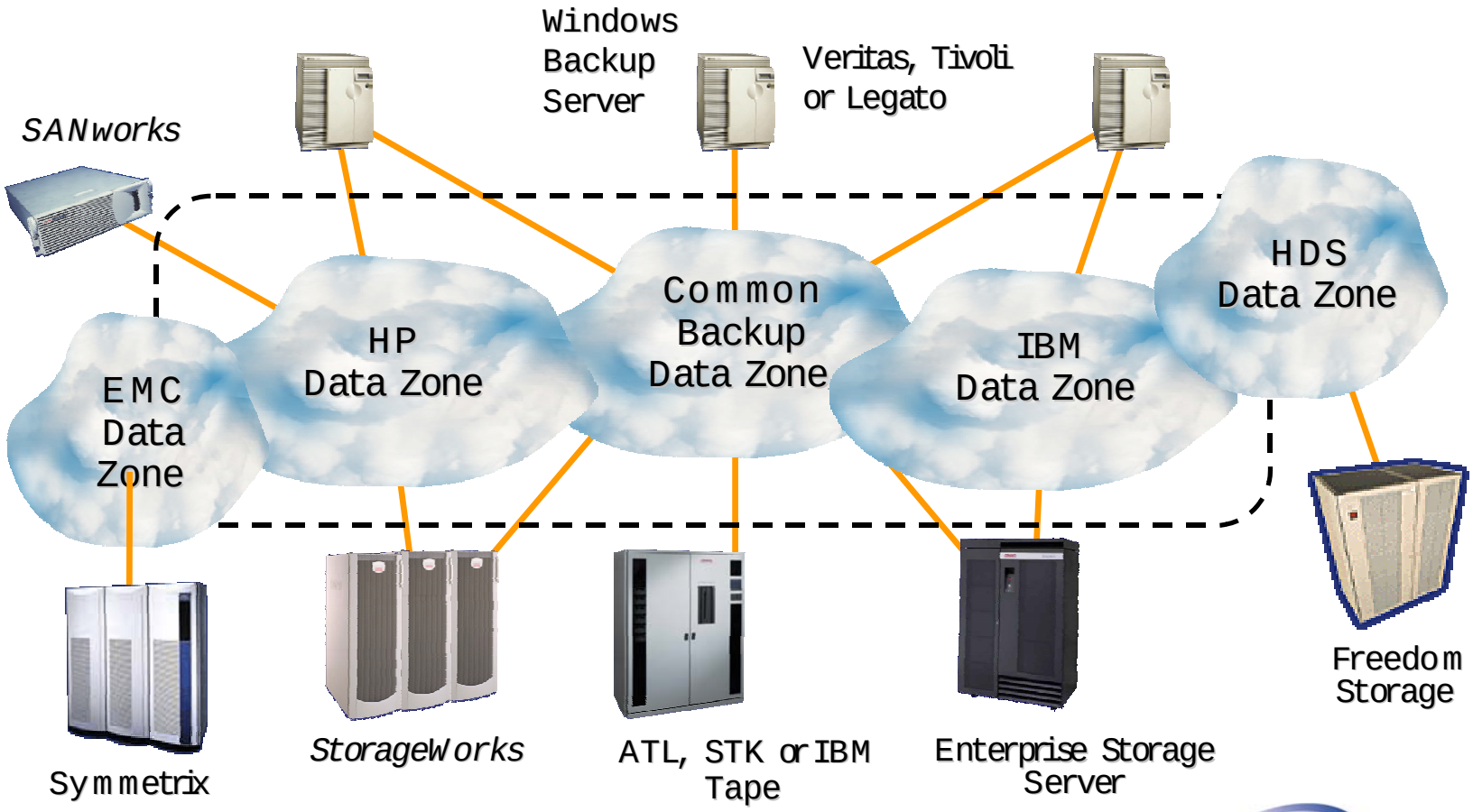
building open san supported solutions through multi-vendor cooperation



SNIA Technology Center



SNIASSF supported solutions



management cooperation

Some storage vendors have effected exchanges of their respective API's leading to a promise of cross platform management capabilities.

examples:

OpenView Storage Area Manager

- Designed to promote hardware interoperability with OpenView SAM

StorageWorks Enterprise Solutions Developer's Program

- Designed to facilitate industry partners' efforts to integrate the features of StorageWorks into their products, and deliver an extensive portfolio of highly integrated solutions tailored specifically to StorageWorks

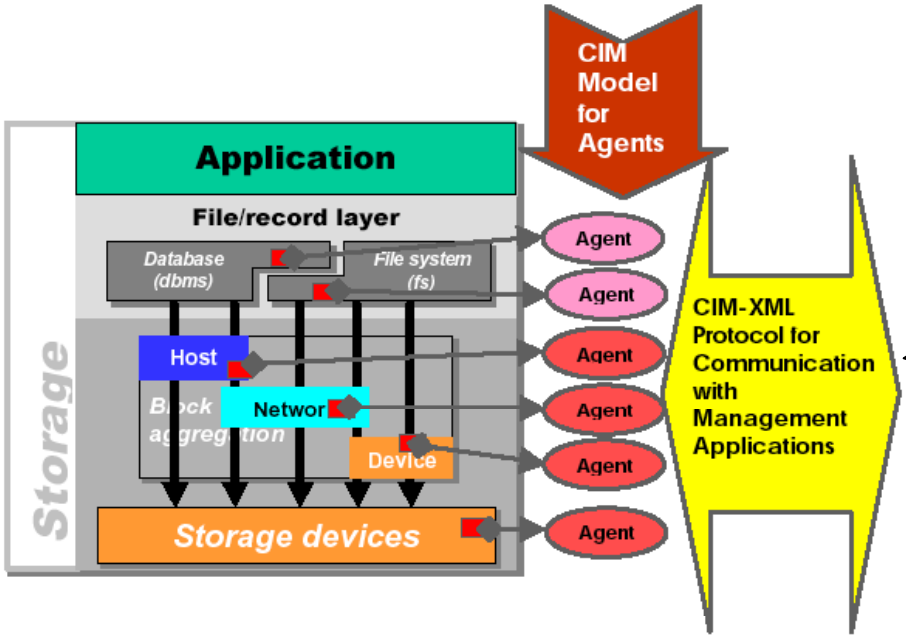
management unification

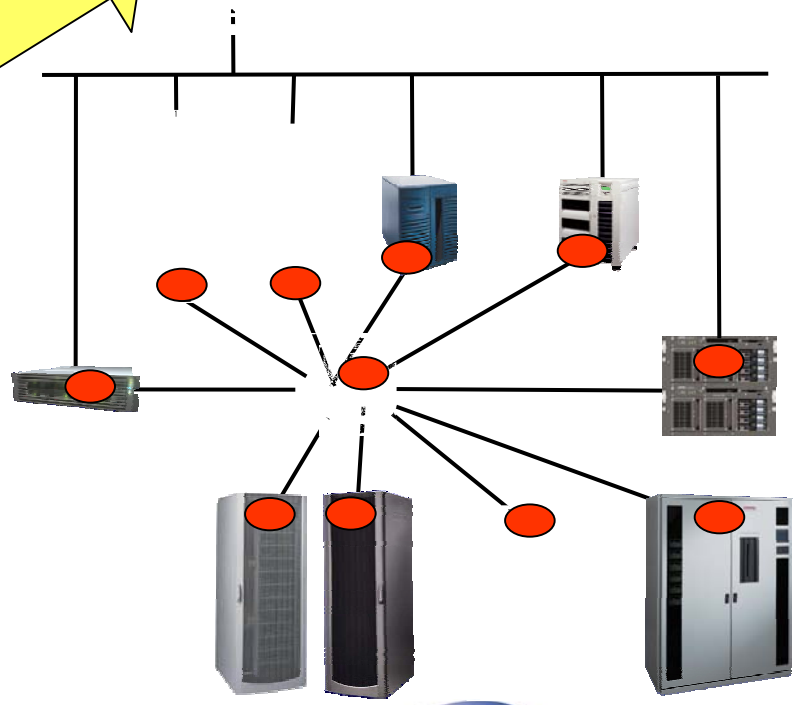
- common management interfaces will enable software interoperability
- example: Bluefin
  - initial development by 17 company consortium
  - continuing development through the SNIA
  - builds on SNIA Common Information Model (CIM)

bluefin overview

- provides framework for linking management agents with devices
- complete, consistent end-to-end specification
  - Automated discovery, locking, security
  - Automated configuration management
  - Far more powerful than SNMP
- willenable multi-vendor management interoperability

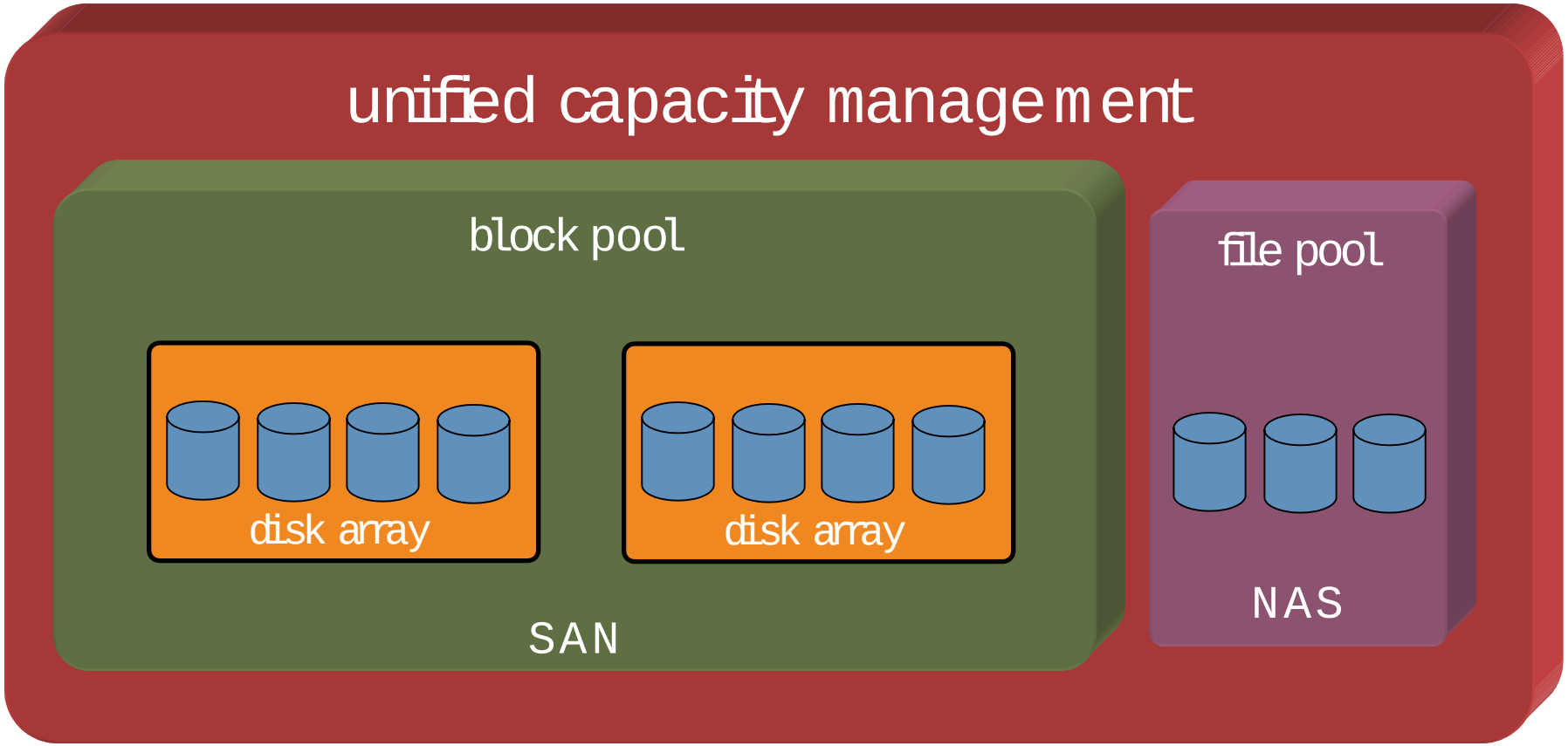
bluefin





Bluefin agents link devices with management applications

management simplification

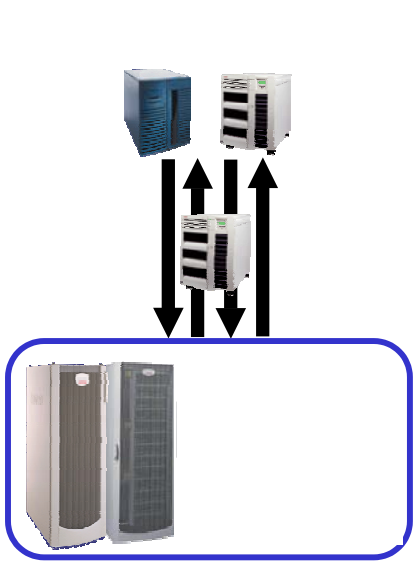


how to simplify?

- with virtualization
  - unifies storage into a common pool
  - LUN management based on application attributes
- improves capacity utilization
  - vastly reduces stranded capacity
- improves application availability
  - dynamic pool and LUN expansion
  - dynamic data movement within pool
- improves performance
  - load balance across all disks in pool

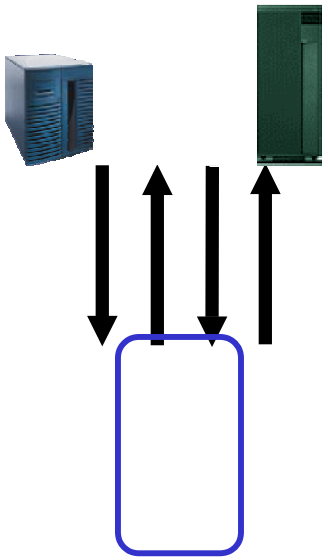
the ultimate management simplification

Server Software



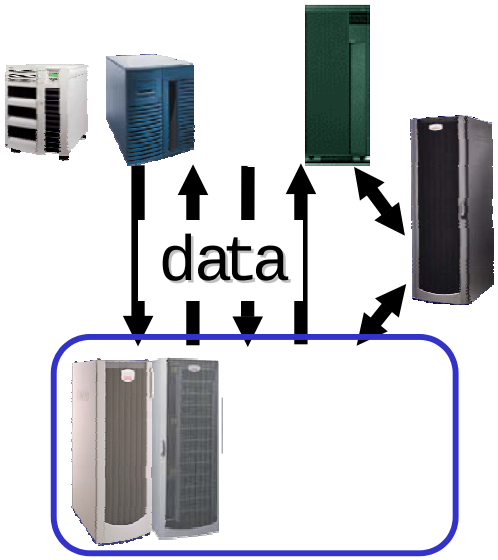
controller independent
example: Virtual Replicator

Virtualized Array



server independent
example: Enterprise Virtual Array

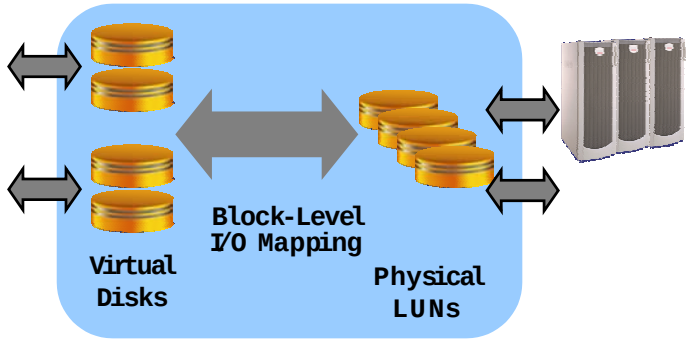
SAN Appliance



storage and server independednt
example: SANlink Appliance

simplification with virtualization

- virtualization erases physical boundaries
  - RAIDset transparency
  - storage system transparency
- higher utilization with storage pooling
- greater deployment flexibility
- fewer entities to manage
- greater management automation



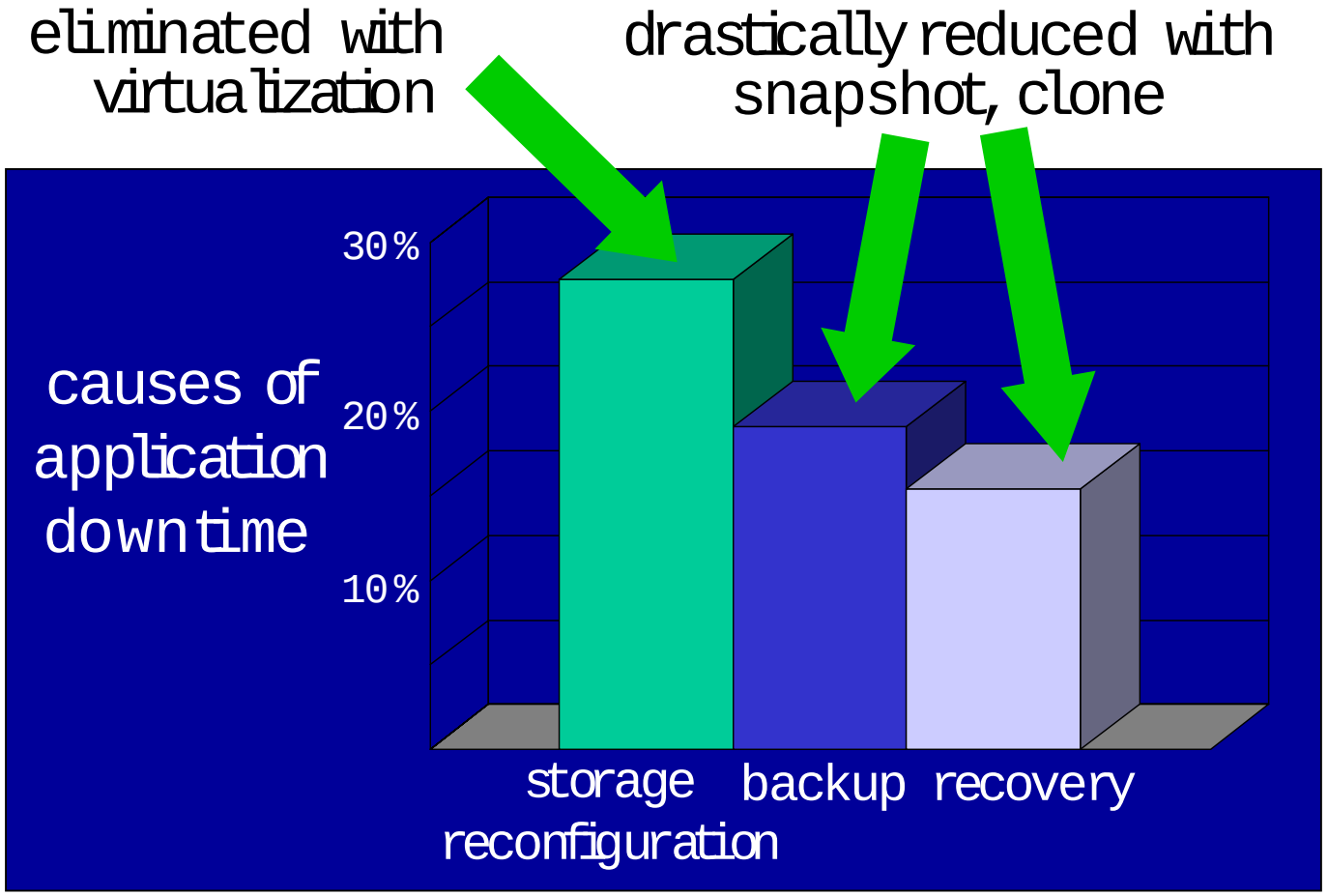
simplifying disk management

- management by application-relevant attributes
  - capacity
  - server visibility
  - data availability
  - RAID protection level
  - performance characteristics
  - storage pool hierarchy location
- attributes are specified when a virtual disk is created

snapshots improve availability example: hp VersaStor Vsnap

- virtually capacity-free snapshots of virtual disks
- take a Vsnap in seconds
- Vsnap takes almost no physical capacity
- Vsnap is disk-based backup
  - eliminates backup window
- mount Vsnap in seconds for disk-based recovery
- mount Vsnap and copy to tape anytime for archive

reduce downtime



enabled by networked storage

the management enhancements discussed are thwarted or minimized

	without networked storage
management integration	not possible
management heterogeneity	not possible
management cooperation	limited utility
management unification	not possible

conclusions

- networked storage offers excellent opportunities for improving storage management efficiencies

- storage management can be re-defined to:
  - integrate multiple management task reporting, status and control
  - be effective for heterogeneous environments
  - benefit from vendor cooperation or common management interfaces
  - apply virtualization to aggregate storage into virtual pools

- industry efforts like SSF and Bluefin continue to improve SAN interoperability and utility

- in the future--
  storage management will be simplified significantly with ongoing development of interoperable management applications and virtualization