



Education

An Introduction to Managing Storage

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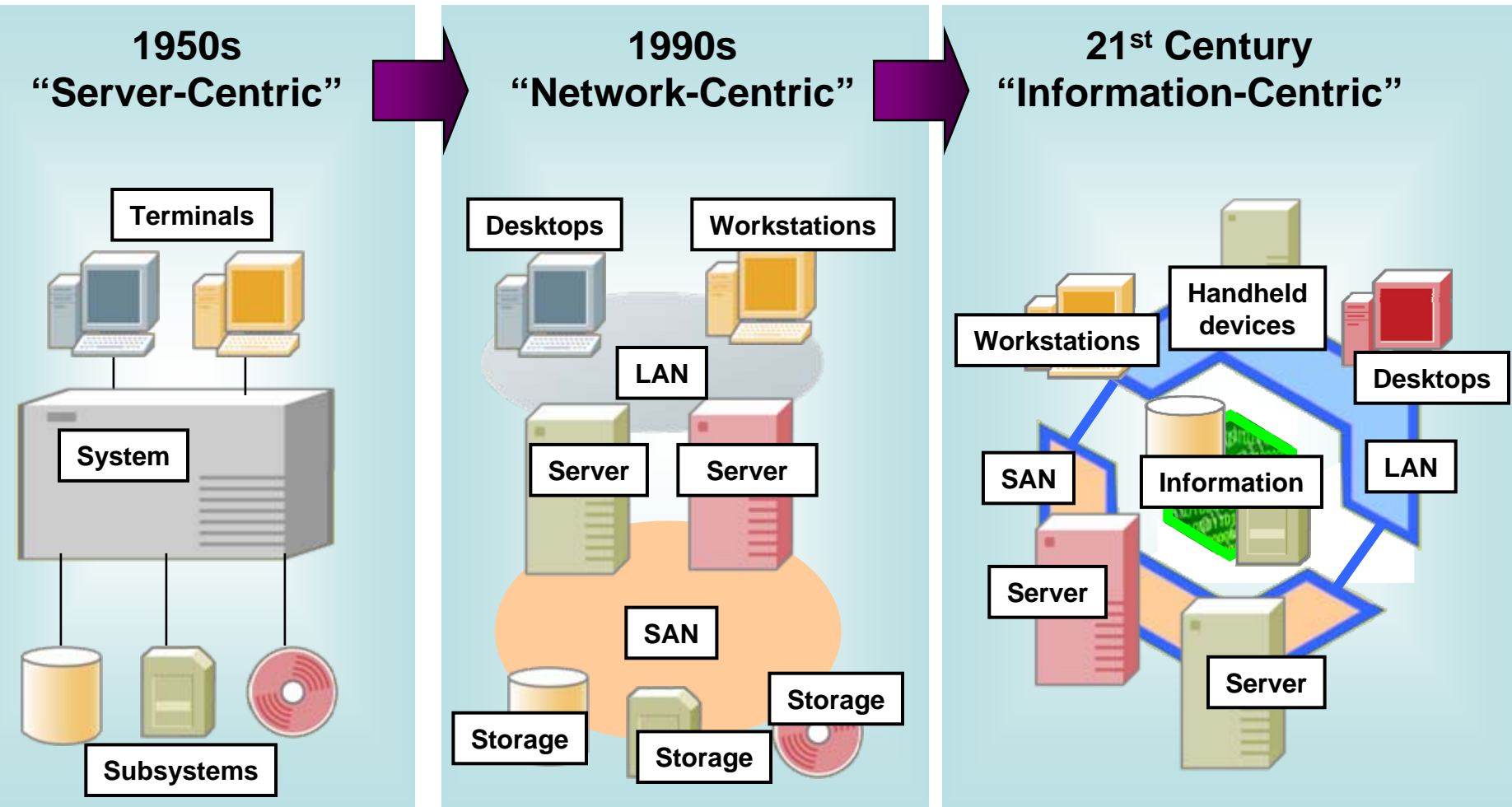
- This session will discuss managing the storage infrastructure. It will describe the basic of storage management, describe how SMI-S helps with managing diverse storage networks, and provides approaches that can be undertaken to get answers to many storage questions.
- This presentation will explain ways to get started, where you can get some help, and outlines goals and objectives that can assist you in obtaining sponsorship from your storage management project.
- **Learning Objectives:**
 - ◆ Review basics of managing a storage environment and how SMI-S fits with providing better management.
 - ◆ Describe approaches that can be taken and define the goals and objectives that will help you achieve improved management of your storage infrastructure.
 - ◆ Tie storage management to enterprise management, including automation, service management and links to your enterprise management solutions

Presentation Topics

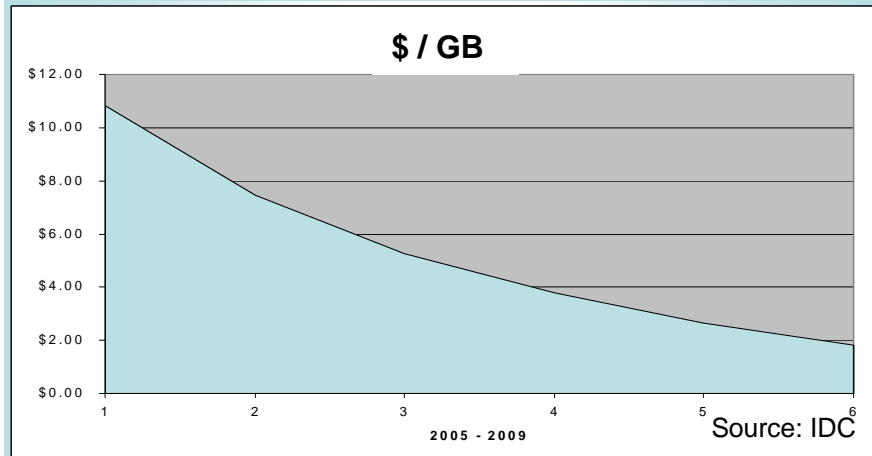
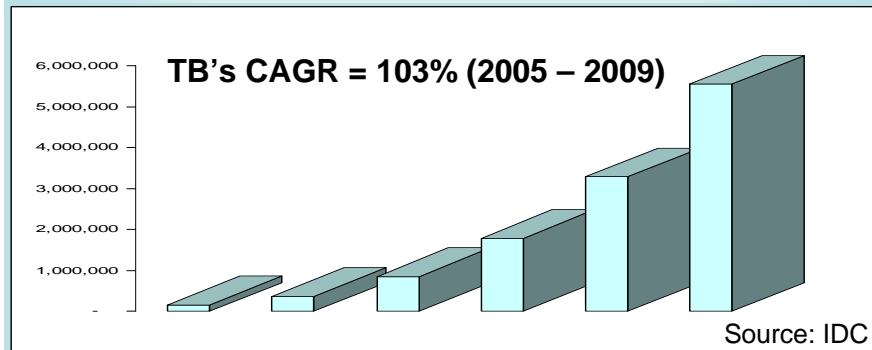
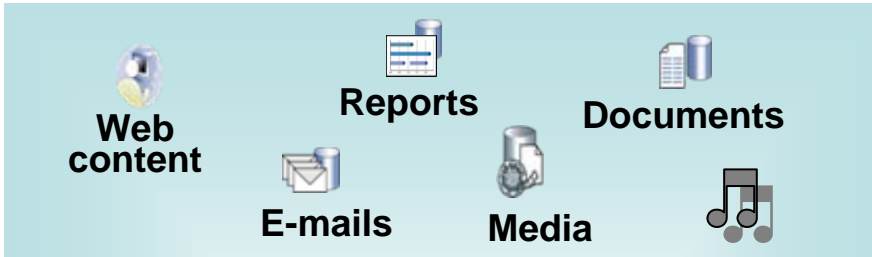
- The evolution of our storage networks
- Storage management challenges
- Why is management important? What needs to be managed?
- What does managing storage mean?
- What types of management products exist? What do they do?
How do they relate to each other?
- How does SNIA and SMI-S help you manage your storage network?

The Evolution of Storage Networks

Managing Information in Silos has become Obsolete



Storage Management Challenges



➤ Variety of Information

- Information Technology holds the promise of bringing a variety of new types of information to the people who need it

➤ Volume of Data

- Data is growing exponentially

➤ Velocity of Change

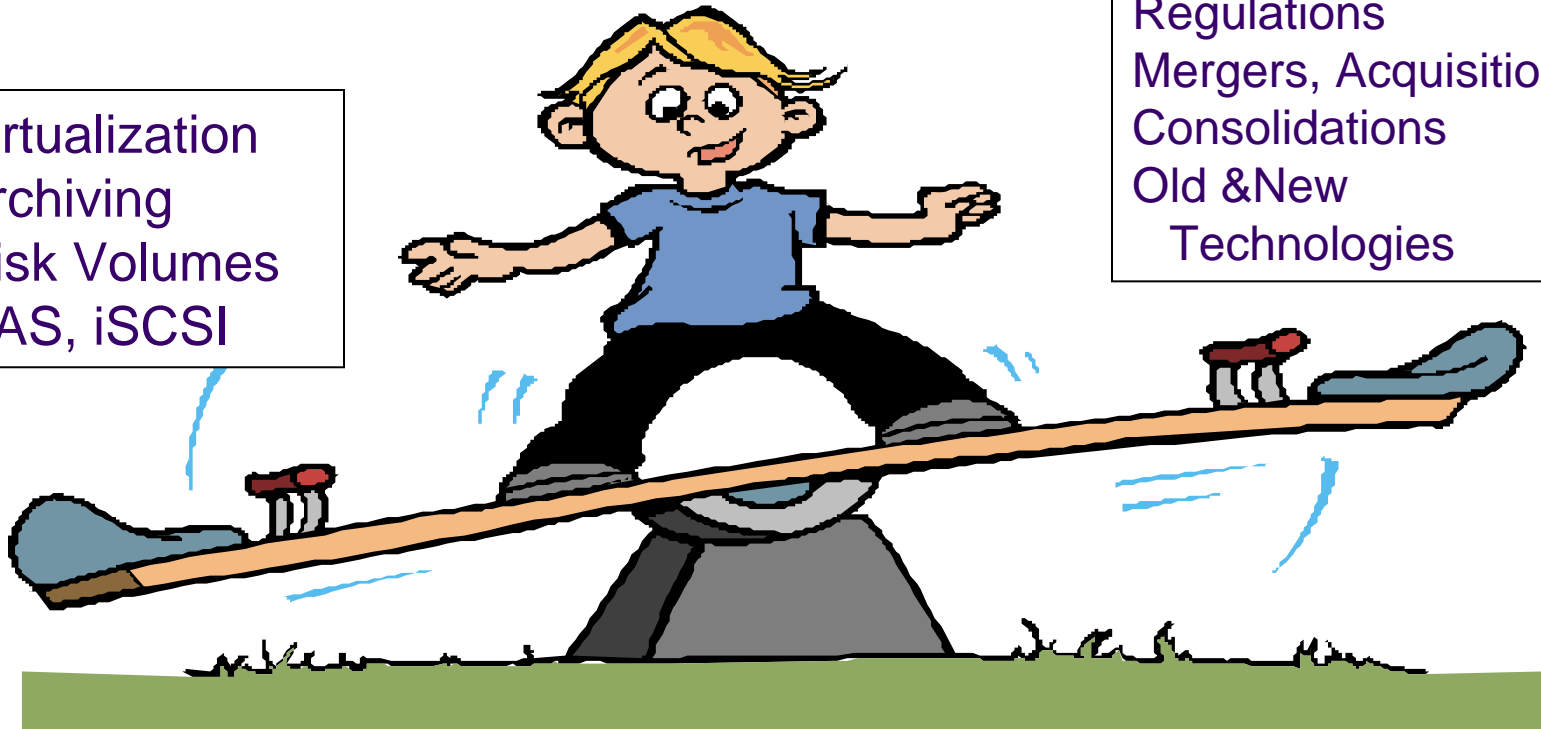
- IT Organizations are under tremendous pressure to deliver the right IT services.
- 85% of problems are caused by IT staff changing something.
- 80% of problems not detected by IT staff until reported by end user

Why is Management Important?

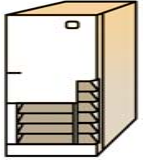
Staff size the same?

- Virtualization
- Archiving
- Disk Volumes
- NAS, iSCSI

- Compliance
- Regulations
- Mergers, Acquisitions
- Consolidations
- Old & New Technologies



What needs to be managed?



➤ Server

- ◆ Applications
- ◆ Data Bases
- ◆ File Systems
- ◆ Volume Managers
- ◆ Host Bus Adaptors
- ◆ Multi-Path Drivers

➤ Network Components

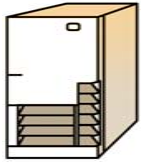
- ◆ Switches, hubs, routers
- ◆ Intelligent switch replication



➤ Storage Components

- ◆ Volume mapping / virtualization
- ◆ Storage Array provisioning
- ◆ NAS filers
- ◆ Tape Libraries

How does it need to be managed?



➤ Discovery

- ◆ Topology views
- ◆ Asset management

➤ Performance Management

- ◆ Bottleneck Analysis
- ◆ Load Balancing



➤ Configuration Management

- ◆ Provisioning
- ◆ Optimization
- ◆ Problem Determination

➤ Reporting

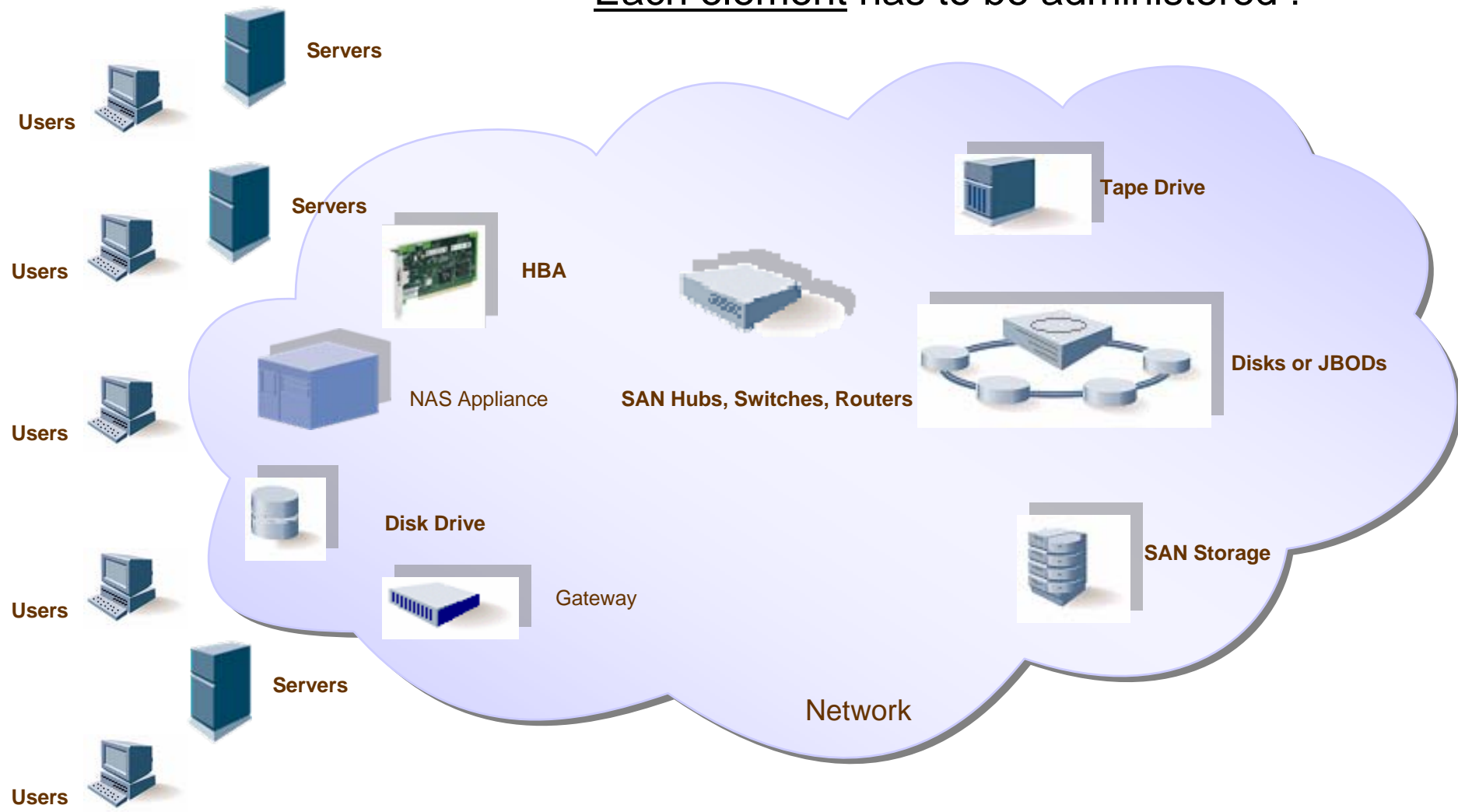
- ◆ Asset/Capacity/Utilization
- ◆ Accounting/Chargeback
- ◆ Performance/Trending
- ◆ Problem Reports



As we are dealing with a network, we will need to work with the end-to-end network configuration, not just the individual components

Administration of a Storage Network **SNIA**

Each element has to be administered !



Storage Management Challenges

➤ Leverage Information

- ◆ Capitalize on data sharing for collaboration
- ◆ Align storage investments, informational value

➤ Optimize IT

- ◆ Automate and Simplify IT operations
- ◆ Optimize Performance, Functionality

➤ Mitigate Risk

- ◆ Comply with regulatory, security requirements
- ◆ Keep your business running continuously

➤ Enable Business Flexibility

- ◆ Flexible, On Demand IT infrastructure
- ◆ Protect your IT investment



Storage Management

- Leverage Information
- Optimize IT
- Mitigate Risk
- Enable Business Flexibility

How much storage do I have available for my applications?

Which applications, users and databases are the primary consumers of my storage?

When do I need to buy more storage?

How reliable is my SAN?

How is my storage being used?

Storage Management

- Leverage Information Management
- Optimize IT
- Mitigate Risk
- Enable Business Flexibility

How do I simplify and centralize the management of my storage infrastructure?

How do I know the storage is not the bottleneck for user response time issues?

Is the storage infrastructure available and performing as needed?

Storage Management

- Leverage Information
- Optimize IT
- Mitigate Risk
- Enable Business Flexibility

How do I monitor and centrally manage my replication services?

How do I maintain storage service levels?

Which files must be backed up, archived and retained for compliance?

Storage Management

- Leverage Information
- Optimize IT
- Mitigate Risk
- Enable Business Flexibility

How can I automate the provisioning of my storage systems, databases, file systems and SAN?

How do I maintain storage service levels?

How do I monitor and centrally manage my replication services?

How can you address these?

- ◆ **Leverage Information**
 - ◆ Reporting
 - ◆ Data Classification
- ◆ **Optimizing IT**
 - ◆ Centralizing Management
 - ◆ Storage Virtualization
- ◆ **Mitigate Risk**
 - ◆ Tiered Storage
 - ◆ Information Lifecycle Management
- ◆ **Enable Business Flexibility**
 - ◆ Service Management

By using a Storage Resource Manager, you can address each of these areas



How does a SRM help?

➤ Reports on storage infrastructure

- ◆ Assets/Capacity
- ◆ Applications and Database awareness

➤ Chargeback for storage usage

- ◆ Control storage costs

➤ Data Classification

- ◆ Managing storage and data based on level of criticality of information
- ◆ Manage compliance
- ◆ Manage storage tiers and tier based service levels

How does a SRM help?

➤ Centralization

- ◆ End to end visibility
- ◆ Storage provisioning
- ◆ Event management
- ◆ Performance Management
- ◆ Configuration Management

➤ Analytics

- ◆ Historical configuration changes
- ◆ Workload based provisioning
- ◆ Performance analysis
- ◆ Configuration analysis

➤ Service Management

- ◆ Align your storage and data management policies with your business goals
- ◆ Automation/workflow based management

Storage Resource Management

- **Discovery of the storage infrastructure**
 - ◆ Storage arrays, switches, HBAs
 - ◆ Cluster and virtualization mapping
 - ◆ Files and Database usage
- **Configuration for SAN switches, disk and tape libraries, multi-path drivers**
 - ◆ Ability to provision from a single control point
- **Storage event management**
 - ◆ Events received for awareness and automation
 - ◆ SRM events created for thresholds, health checking
- **Performance metrics**
 - ◆ SAN switches
 - ◆ Disk systems
 - ◆ Virtualization
- **Analytics**
 - ◆ End to end configuration analysis for best practices
 - ◆ End to end performance bottleneck analysis
- **Service Management**
 - ◆ Service process focused (ITIL) versus element focused
 - ◆ Automation/workflow based management

Components of a Storage Resource Management Application

- ◆ Administration console
- ◆ Discovery
- ◆ Topology and asset views
- ◆ Storage repository
- ◆ Configuration management
- ◆ Change management
- ◆ Performance management
- ◆ Event management
- ◆ Capacity management and planning
- ◆ Quota management
- ◆ Chargeback
- ◆ SAN design and analysis
- ◆ Provisioning
- ◆ Workflow automation
- ◆ Root-cause analysis
- ◆ Reporting (assets, capacity, problems, performance)

How can you get started?

Develop a plan to deploy a Storage Resource Manager!

To get started, choose between these 2 paths



Focus on reporting

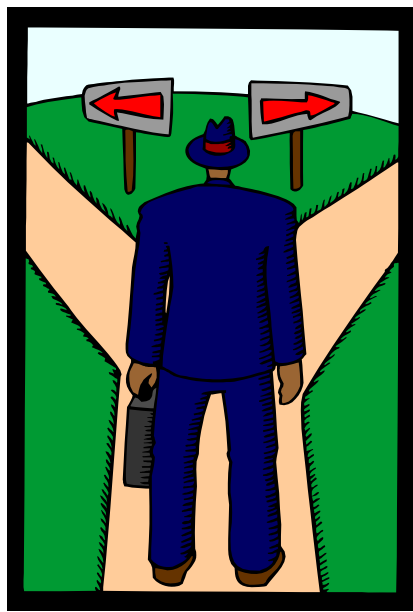
Focus on optimization

Level 1

- Asset Management
- Capacity Planning
- Chargeback

Level 2

- Policy-Based Storage Utilization
- Support GREEN initiatives



- Flexible storage architecture
- Centralize storage administration

Level 1

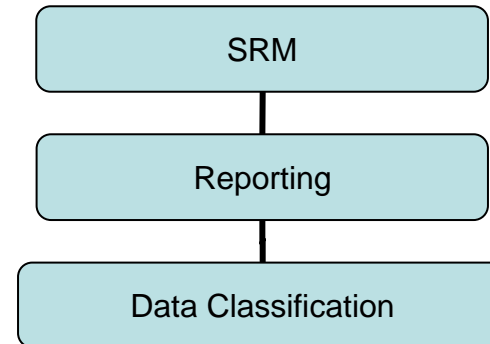
- Analytics for optimization
- Service Management

Level 2

Level 1 for Reporting

➤ Data Classification

- ◆ Categorize storage usage
- ◆ Enable chargeback for storage cost recovery
- ◆ Recover storage



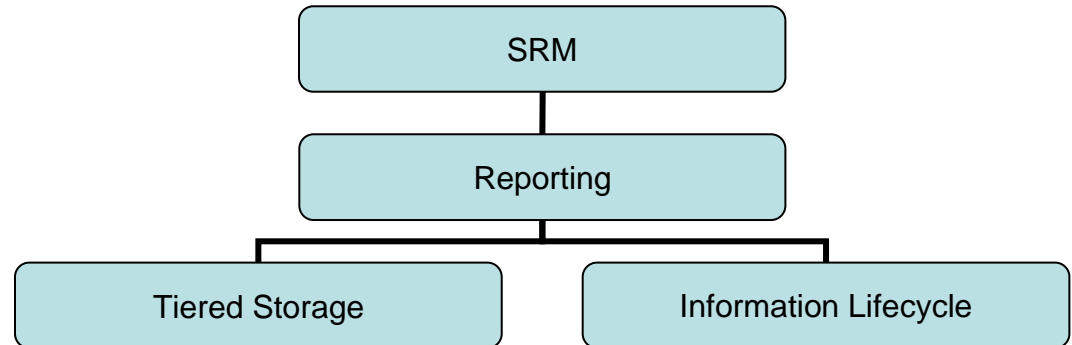
Level 2 for Reporting

➤ Tiered Storage

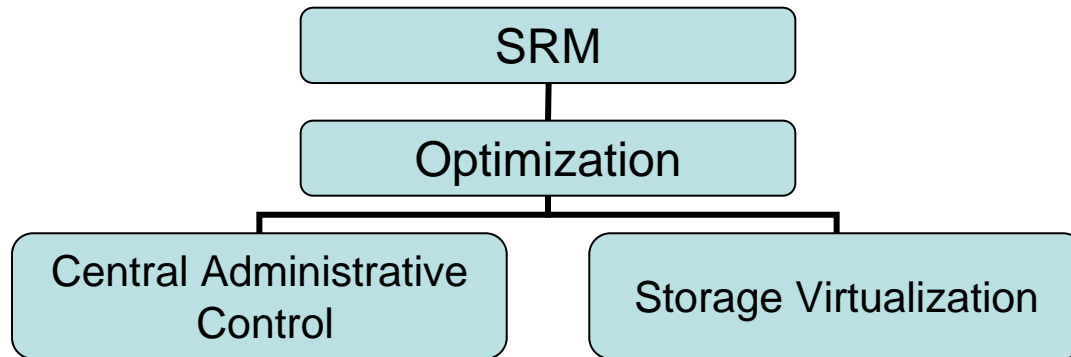
- ◆ Policy based storage utilization
- ◆ Support your GREEN initiatives

➤ Information Lifecycle Management

- ◆ Archive/HSM/delete files as needed
- ◆ Migrate/rebalance storage workloads



Level 1 for Optimization



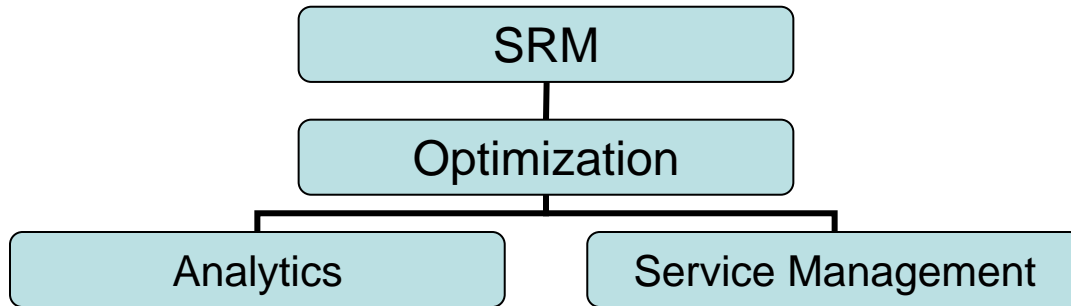
➤ Central Administrative Control

- ◆ Quicker problem resolution times
- ◆ Better utilization of storage resources

➤ Storage Virtualization

- ◆ Implement storage virtualization for more flexible storage infrastructure (quicker provisioning)

Level 2 for Optimization



➤ Analytics

- ◆ Storage provisioning
- ◆ Configuration analysis
- ◆ Performance analysis

➤ Service Management

- ◆ Workflow based management
- ◆ Applications/Business correlation
- ◆ Service Level management

SNIA and SMI-S Basics

➤ What is SNIA?

- ◆ The Storage Networking Industry Association
 - Made up of some 400 member companies and nearly 7000 individuals Refer to www.snia.org/home for more information

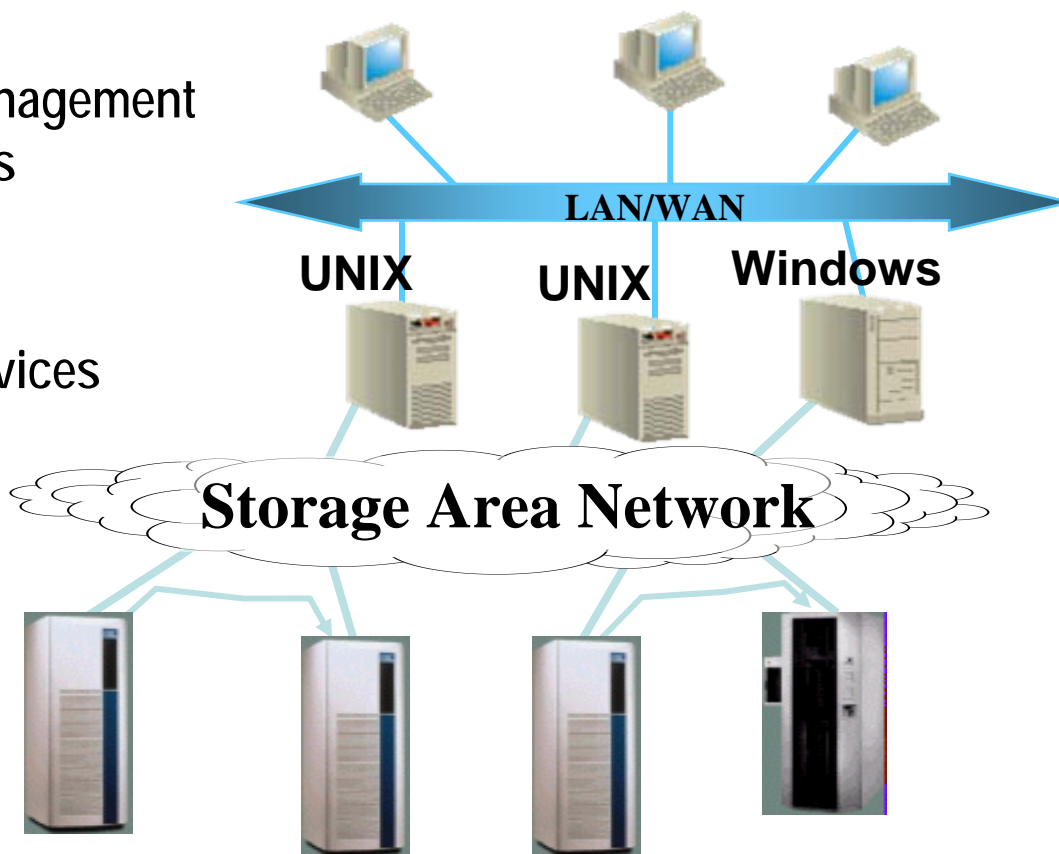
➤ What is SMI-S?

- ◆ Storage Management Initiative Specification
 - The specification was designed with the purpose of standardizing and streamlining storage management functions and features into a common set of tools that address the day-to-day tasks of the IT environment.
 - Refer to www.snia.org/forums/smi/tech_programs/smis_home

SMI-S Based Storage Management Solution

Storage Management
Applications

Storage Devices



‘Clients’

TCP/IP connection
(CIM/WEBM)

‘Providers’

Providers can be
located on the
storage device
or via Proxy

Management agents are typically required to be installed
on hosts for file system and database scans

What can SMI-S Cover?

- **Fabric**
 - ◆ Discovery and Topology
 - ◆ Zoning Discovery
 - ◆ Zoning Config and Control
 - ◆ Fabric Device Management Interface (FDMI)
- **Switches**
 - ◆ Asset information
 - ◆ Status and Statistics
 - ◆ Blades
- **Arrays**
 - ◆ Asset information
 - ◆ Storage allocation.
 - ◆ LUNs: creation, masking & mapping
- **Libraries**
 - ◆ Media management and Library virtualization
- **Routers**
 - ◆ Masking and Mapping
- **Virtualization**
 - ◆ In Band and Out of band
- **Host attachment**
 - ◆ iSCSI/SATA ..
 - ◆ Mount/dismount volumes
 - ◆ Multi-pathing
- **Volume Management**
- **NAS**

➤ Automated Discovery

- ◆ Allows new devices to be configured, monitored and deployed automatically
- ◆ Discovery of what the device is capable of and the interface for managing that capability
- ◆ Storage Managers can discover and show a topology of the SAN and the status of each device
- ◆ The topology can be used as a launch point for device and vendor specific user interfaces

SMI-S Capabilities

➤ Monitoring

- ◆ SMI-S Provides basic status for each device
- ◆ Changes in status can be sent as indications

➤ Indications

- ◆ Events are signaled asynchronously and delivered to any application that needs to know
- ◆ Indications can also be fed into event managers and correlated

SMI-S Capabilities

➤ Active Management

- ◆ SMI-S enables control over storage devices in the SAN
 - LUN Masking and Mapping
 - Ability to manipulate the access control to array volumes (LUNs) from host FC ports
 - LUN Creation and Pool Management
 - Carve volumes from undifferentiated storage specifying Quality of Service - like parameters
 - Active Zone Management

➤ Performance Management

- ◆ Array Support
 - Block Server Performance
 - Extent Composition Mapping (enables composite Volumes)
- ◆ Switch Support
 - Fabric Path Performance (Source and Destination of packets)

View classes have been created to improve SRM applications performance

- Please send any questions or comments on this presentation to SNIA: track_storagemgmt@snia.org

**Many thanks to the following individuals
for their contributions to this tutorial.**

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