



Education

An Introduction to Storage Management

Russell Warren, IBM

- The material contained in this tutorial is copyrighted by the SNIA.
- Member companies and individual members may use this material in presentations and literature under the following conditions:
 - ◆ Any slide or slides used must be reproduced in their entirety without modification
 - ◆ The SNIA must be acknowledged as the source of any material used in the body of any document containing material from these presentations.
- This presentation is a project of the SNIA Education Committee.
- Neither the author nor the presenter is an attorney and nothing in this presentation is intended to be, or should be construed as legal advice or an opinion of counsel. If you need legal advice or a legal opinion please contact your attorney.
- The information presented herein represents the author's personal opinion and current understanding of the relevant issues involved. The author, the presenter, and the SNIA do not assume any responsibility or liability for damages arising out of any reliance on or use of this information.

NO WARRANTIES, EXPRESS OR IMPLIED. USE AT YOUR OWN RISK.

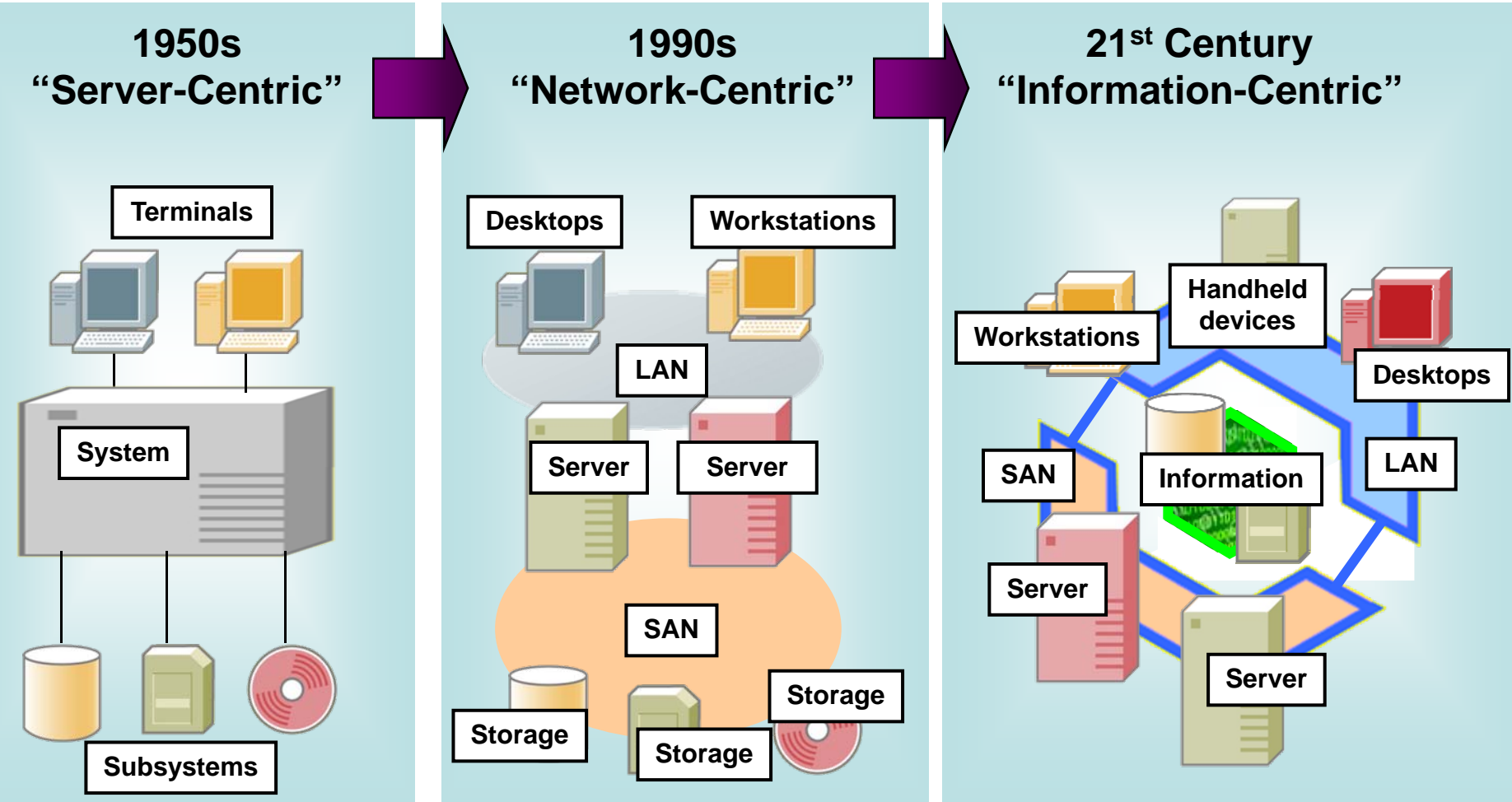
- This session will discuss managing the storage infrastructure. It will describe the basic of storage management, describe how SMI-S helps with managing diverse storage networks, and provides approaches that can be undertaken to get answers to many storage questions.
- This presentation will explain 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

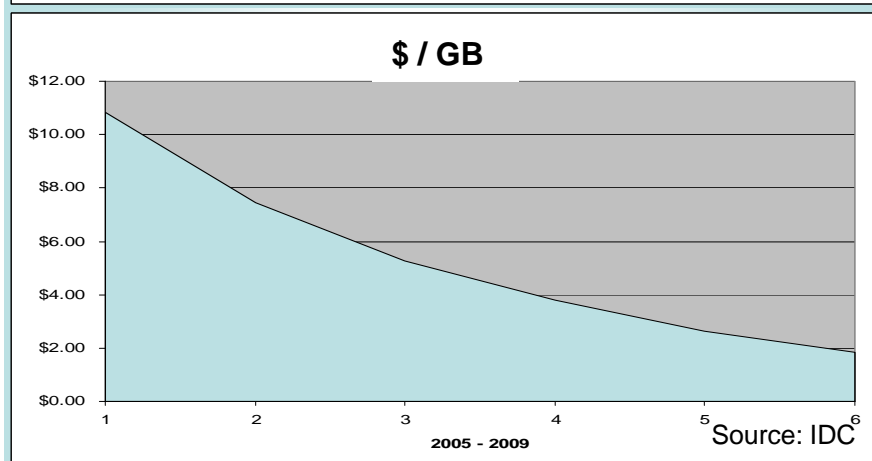
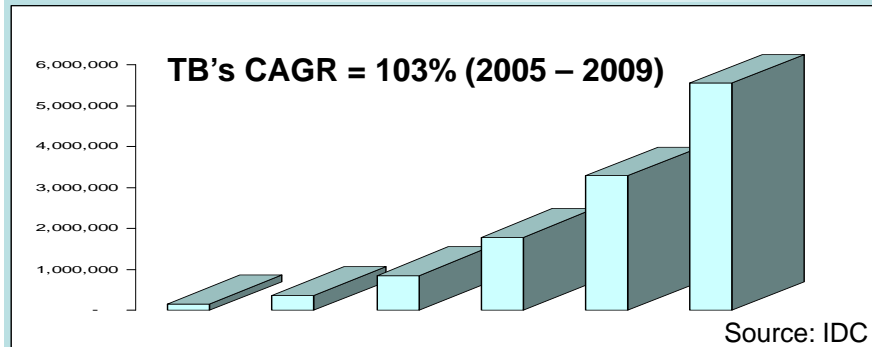
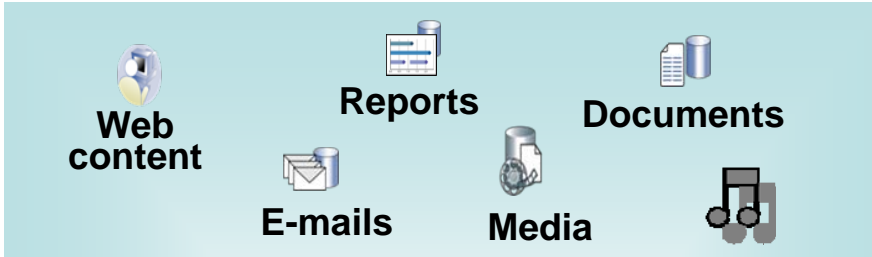
- The evolution of our storage networks
- Storage management challenges
- Why is management important? What needs to be managed?
- What does managing storage mean?
- What types of management products exist? What do they do?
How do they relate to each other?
- How does SNIA and SMI-S help you manage your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

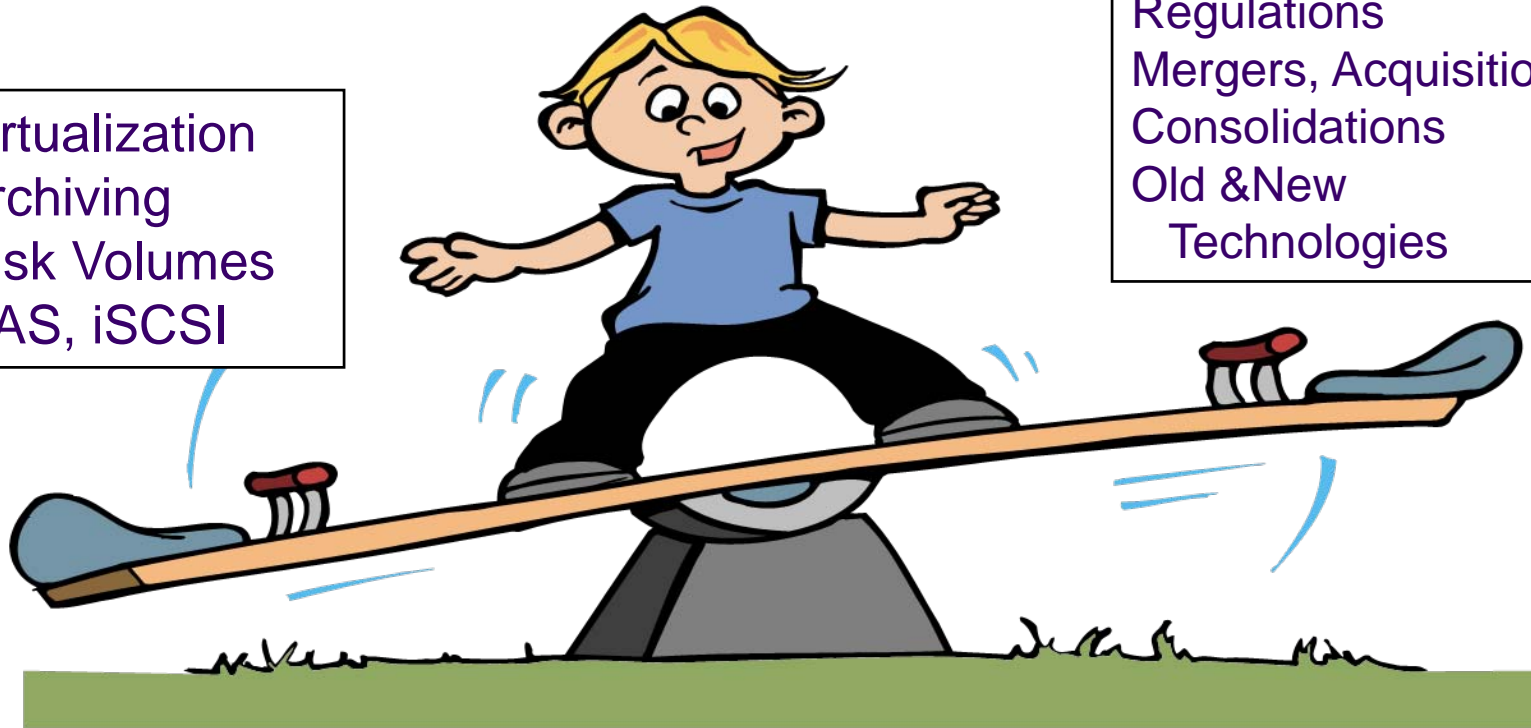
- IT Organizations are under tremendous pressure to deliver the right IT services.
- 85% of problems are caused by IT staff changing something.
- 80% of problems not detected by IT staff until reported by end user

Why is Management Important?

Staff size the same?

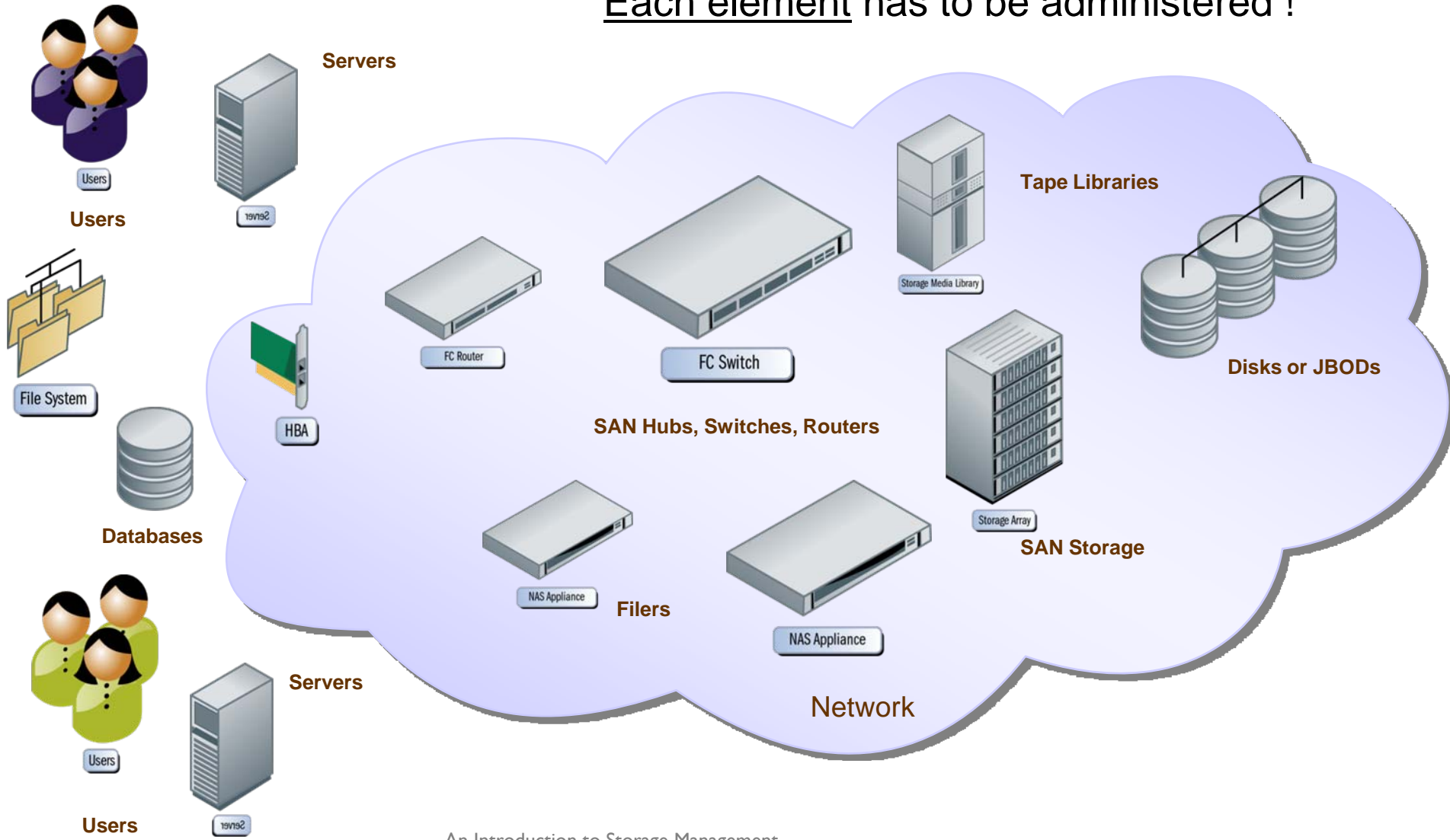
- Virtualization
- Archiving
- Disk Volumes
- NAS, iSCSI

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



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, Availability

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

- **Enable Business Flexibility**
 - ◆ Flexible, On Demand IT infrastructure
 - ◆ Protect your IT investment



- 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
- 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 can I quickly determine the relationships between my applications, servers, and storage resources?

How can I more quickly configure and deploy storage resources?

How can you address these?

- Leverage Information
 - ◆ Reporting
 - ◆ Data Classification
- Optimizing IT
 - ◆ Centralizing Management
 - ◆ Storage Virtualization
 - ◆ Green Features
- 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 and Trending

- ◆ 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



**Check out SNIA Tutorial:
SRM: Can You Get What You
Want?**

How can you get started?

➤ If you want to

- ◆ Provide regular asset and capacity reports to your management and users
- ◆ Know how much storage you have, how it is being used and how quickly you will need to add storage to your file systems, databases and applications
- ◆ Establish some chargeback process to control the amount of storage being used
- ◆ Provide a tiered storage environment approach

Start by deploying the reporting capabilities

➤ If you want to

- ◆ Centralize your storage administration across the SAN
- ◆ Manage the SAN connectivity and performance
- ◆ Automate the configuration of your storage resources and track SAN-wide configuration changes
- ◆ Optimize your storage configuration, ensure best practices
- ◆ Provide a service-based approach to the management of your storage resources

Start by deploying the operational capabilities

Starting with Reporting

- Storage usage: By application, users, storage, databases, file systems
- File system scans can reveal
 - ◆ Old and temporary files that should be deleted (set up an automated 'housekeeping' process to recover this storage on a regular basis)
 - ◆ Files that have not been accessed recently that are candidates for archival
- Data base scans can reveal
 - ◆ Unused space claimed by the database
 - ◆ Size of largest table spaces and trends on growth

Starting with Reporting

- Once you have your reports, you can
 - ◆ Start defining policies for a tiered storage approach
 - > When should each class of storage be provisioned?
 - > When should data be moved to other tiers?
 - ◆ Start defining a chargeback policy, to help control costs
 - > Charging more for the highest tier of storage can encourage better utilization of lower-cost storage solutions
 - ◆ Start defining a strategy to consolidate your storage usage
 - > Consolidate your storage usage onto fewer storage systems or storage using less power
 - > Good place for deploying storage virtualization!
(Easier to mix storage array types and vendors, can shift data without application impact)



**Check out SNIA Tutorial:
Virtualization I – What,
Why, Where and How**

Starting with Operational

- Ability to discover and provision storage resources on the SAN
- Ability to collect and analyze
 - ◆ Storage configuration information
 - > Best practice checking
 - > Historical changes
 - > Release levels of SAN hardware and software
 - ◆ Storage performance
 - > Disk and SAN switch performance
- End to end view of the SAN
 - ◆ Topology views for graphical display
 - ◆ Walk across, drill down on SAN connectivity to the hosts/servers

Starting with Operational

- ◆ Once you have the SRM discovering and managing your SAN resource availability, you can
 - > Apply analytics to determine performance bottlenecks and avoid bottlenecks in future provisioning
 - Rebalance and tune your storage based on past performance
 - > Automate storage tasks, including provisioning and recovery
 - > Provide a service based approach
 - Workflows can tie storage provisioning with host and network provisioning
 - Can tie to manual processes (help desk request, work request) to drive and track IT changes (ITIL based approaches)
 - Tie to applications and business system correlation – connecting storage to the business

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?

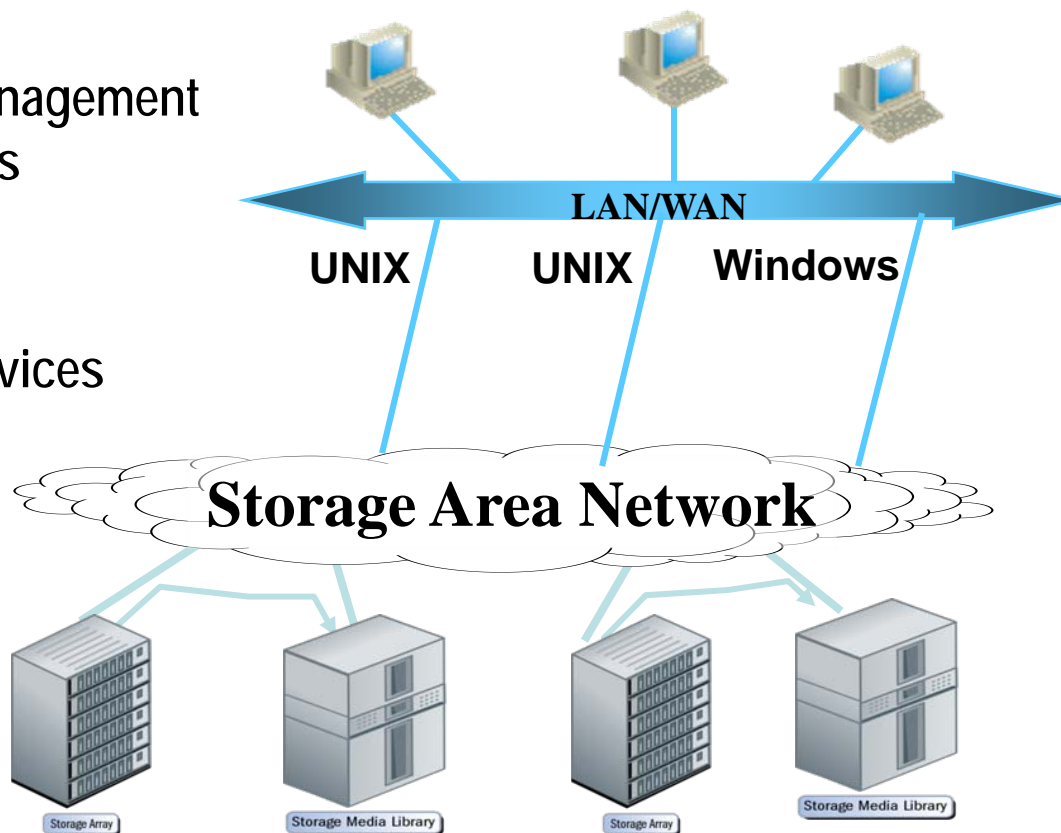
- ◆ Storage Management Initiative Specification

- 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

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



**Check out SNIA Tutorial:
Solving Business-Oriented
Goals with SMI-S**

SMI-S Capabilities

➤ 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: trackstoragemgmt@snia.org

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

- SNIA Education Committee

**Russell Warren
John Foley
Duane Baldwin
Marty Foltyn
Rob Peglar**