Data Lifecycle Management

## Driving and Optimizing Storage

Stewart Bazneh
Tivoli Storage Sales Leader

IBM Tivoli Software

Green issues & energy usage
## - IT is in the spotlight

- Datacentres account for approx 4% of UK corporate electricity usage

- The UK's Climate change bill will legally enforce:

  – 26-32% reduction in UK carbon emissions by 2012

  – 60% reduction by 2050

- EU emissions trading scheme will force polluters to buy additional carbon credits whilst "good citizens" can sell credits

- Power has changed from a cheap commodity to a business-limiting factor

- A Double-Whammy for polluters – expensive power + purchase of carbon credits

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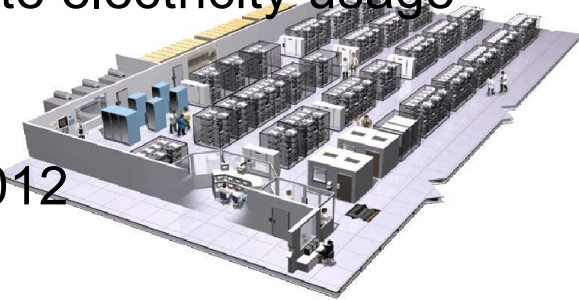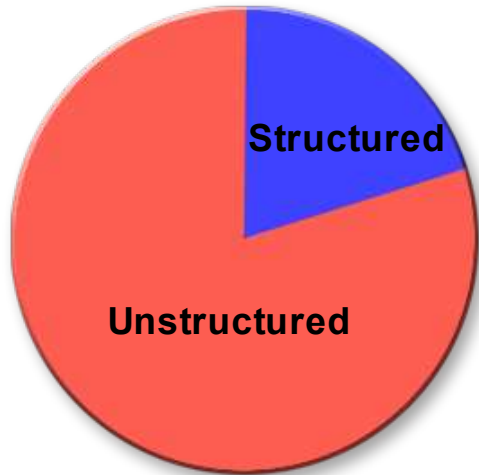
Green issues & energy usage
- IT is in the spotlight

- Excessive heat and insufficient power are the two most critical problems in data centers today.
  - Michael Bell, "Use Best Practices to Design Data Center Facilities," Gartner

- Energy consumption is currently the number one cost for datacentres and virtualisation could be the key to make the Irish IT industry more energy efficient
  - David McAuley, Sustainable Energy Ireland

- A crisis is looming ... around the most fundamental of requirements, the need for power… the average energy costs of running a UK corporate datacentre is currently £5.3 million per year and is set to increase to £11 million over the next 5 years
  - Broadgroup Consultants

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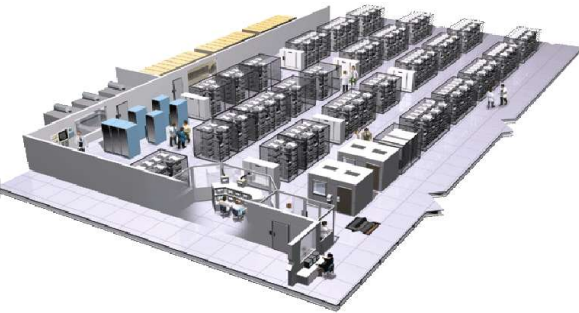
This Information is Driving the Need
For Data Center Transformation

Data Types

Structured

Unstructured

Data Value

1TB/4D image

1MB/2D image

2004   2007

Data Growth

PB shipped

2007 2008 2009 2010 2011 2012

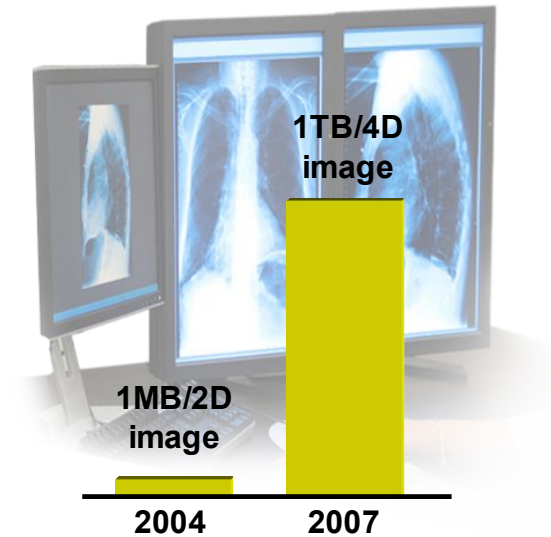*Today*

80% unstructured data
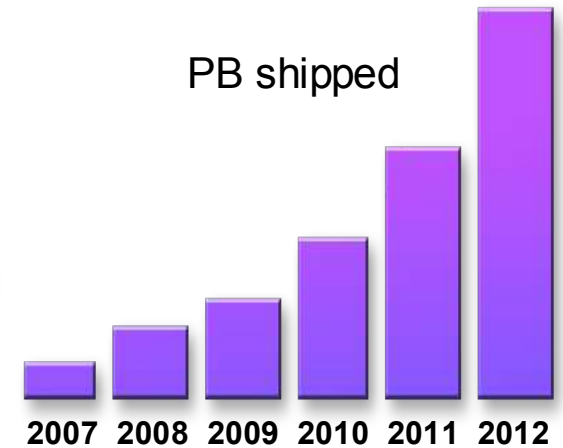
By 2010...

1000x storage per image

Through 2012...

54% annual storage growth

And by 2020…

Personal data footprints will be 16x current levels
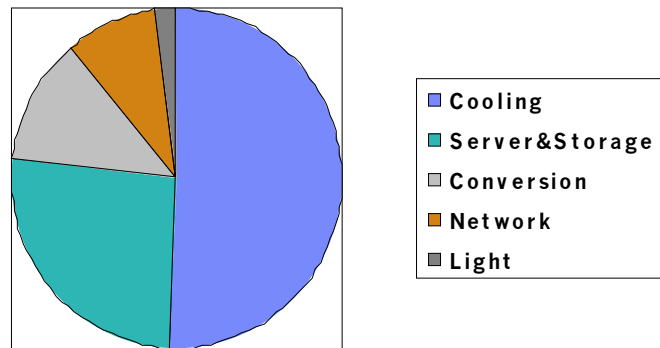
Storage challenges driven by multiple sources

"Buying more hardware" is no longer the answer;
it now requires a comprehensive information centric approach

Line of Business	**Demand shorter recover times and greater availability**
IT Manager	**Manage explosive growth in storage and IT complexities**
Chief Compliance Officer	**Enforce data retention regulations**
Legal Officers	**Require quick access to active archived data for e-discovery**
Security Officers	**Protect data from loss or theft**
CFO	**Reduce labour costs**

Storage Power Landscape

Components of Data Center Power Consumption

Cooling
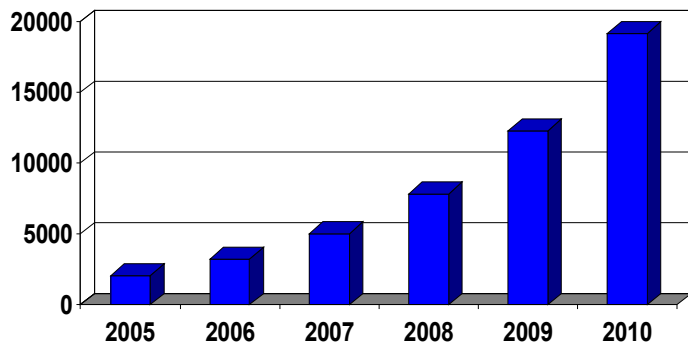Server&Storage
Conversion
Network
Light

Source: IBM

Storage Power Consumption/GB
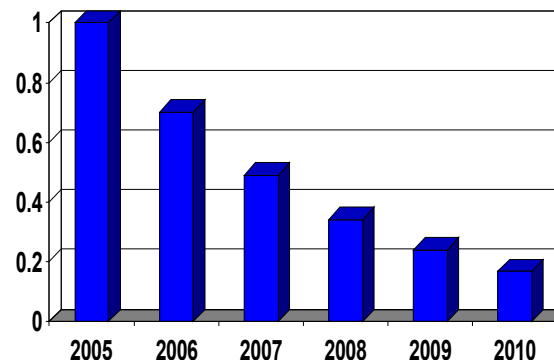
Source: IBM

Data Center Storage Usage External PB Shipped

Source: IDC

Data Center Storage Power Growth
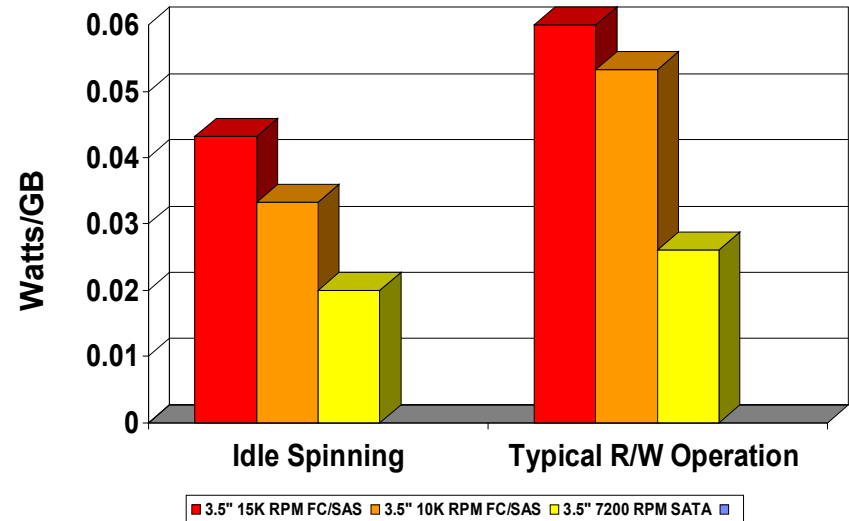

Source: IBM
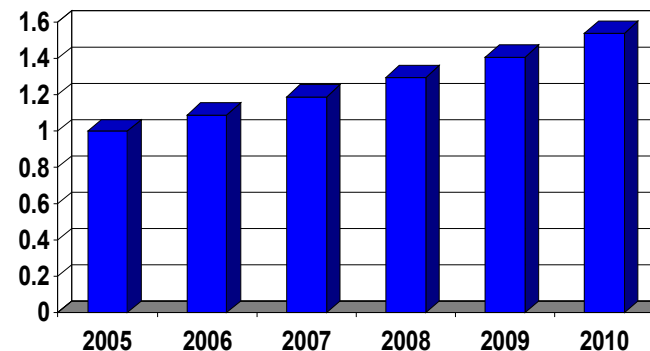
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IBM

Deploy More Power Efficient Storage - *Action*
Place the data on the most power efficient (slowest) storage that meets your needs

Drive Power Use
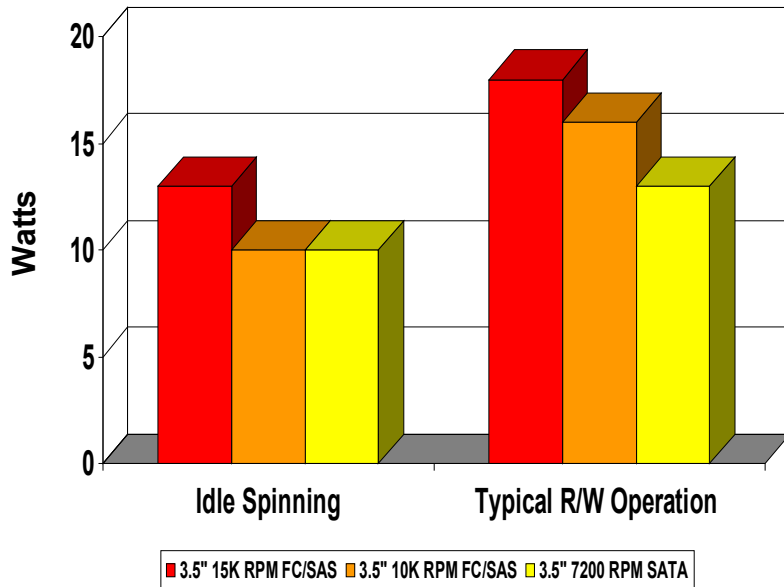
Speed Kills: Best server class drive in Watts/TB is 7,200 RPM 500 GB drive

Source: IBM

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Storage – What's the truth?

Waste Waterfall Chart

unknow n Purchased

Known
Purchased
Storage Capacity

Logically
Configured
Storage
Capacity

Allocated
Storage
Capacity to File
System

Av ailable
Storage
Capacity to
Users

Total Consumed
Storage Capacity

25% -47%

Unique Data Stored

| **Physical** | **Logical** | **Allocated** | **Available** | **Claimed** | **Used** |
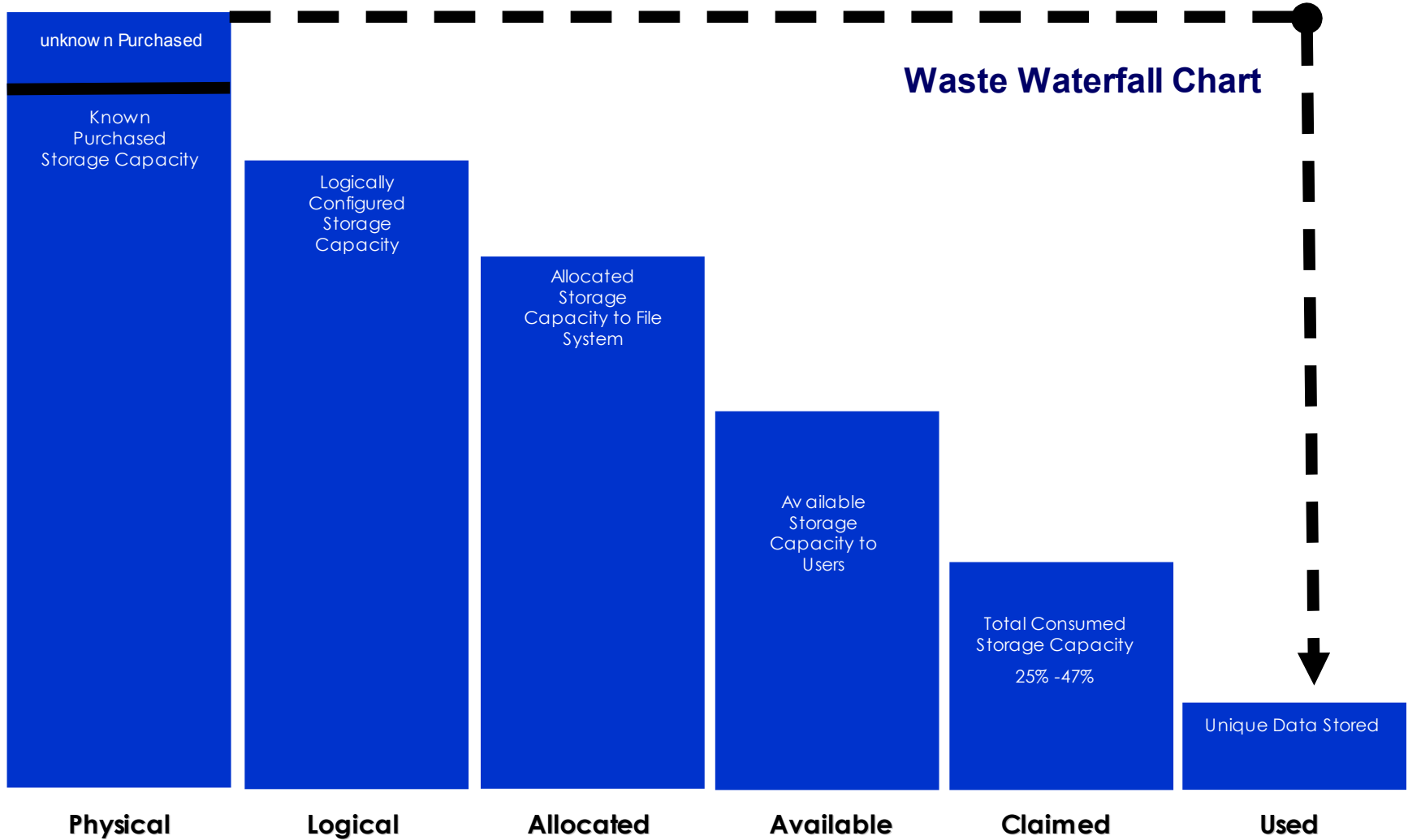
Deploy More Power Efficient Storage – *Facts*
Tape Power & Cooling is Dramatically Better Than Disk

	SATA Disk	Tape	D:T Ratio
Hardware	$5,067,652	$269,771	19
Prod + DR Carts	$0	$168,750	0
Maintenance	$0	$240,036	0
Power & Cooling	$805,098	$40,396	20
Floorspace	$493,200	$227,452	2
Estimated Cost	**$6,365,950**	**$946,405**	7

Tape is
very "**green**"
@ 20x less
energy expense

Customer Storage Goals:
- Performance
- Compliance
- Data Security
- Disaster Protection
- Reduce TCO and energy costs

All disk or all tape
may not address all goals

10 Year TCO Analysis

$6,365,950

$946,405

■ Floorspace
■ Power & Cooling
■ Maintenance
■ Prod + DR Carts
■ Hardware
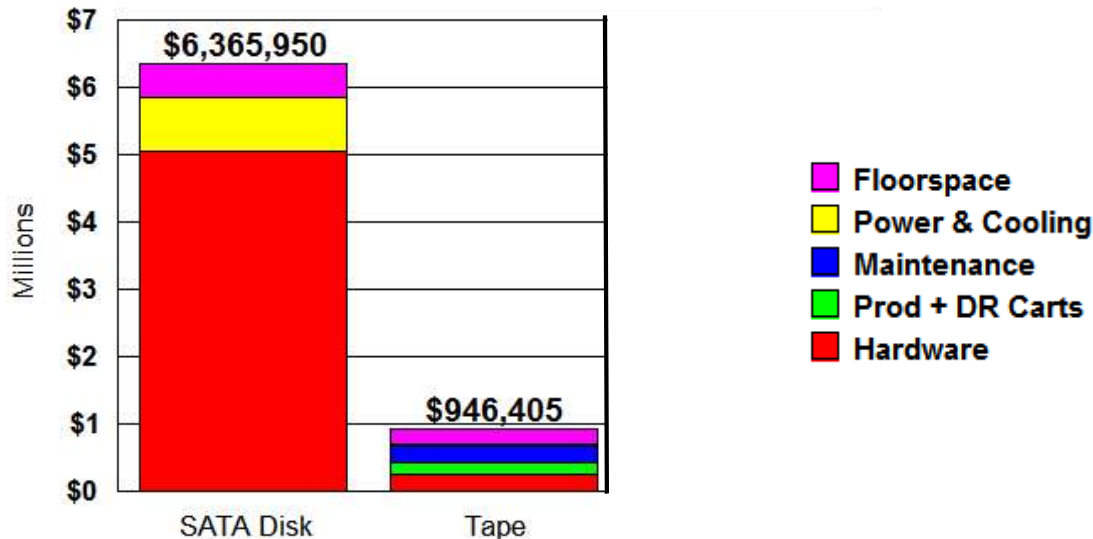
Scenario:
→ Store 250TB
→ 25% Growth Rate
→ Over 10 Years
→ DS4700 SATA Disk
→ LTO 4 Tape Library

Deploy More Power Efficient Storage – *Action*
Combine Tape & Disk to Address Goals and Best "Green" Practice

	SATA Disk	Tape	Blended D+T	D:T Ratio	D:B Ratio
Hardware	$5,067,652	$269,771	$1,376,693	19	4
Prod + DR Carts	$0	$168,750	$126,250	0	0
Maintenance	$0	$240,036	$208,699	0	0
Power & Cooling	$805,098	$40,396	$211,612	20	4
Floorspace	$493,200	$227,452	$332,092	2	1
Estimated Cost	**$6,365,950**	**$946,405**	**$2,255,346**	**7**	**3**

**Customer Storage Goals:**
- Performance
- Compliance
- Data Security
- Disaster Protection
- Reduce TCO and energy costs

Blended disk and tape can address the goals

IBM Blended Disk and Tape Products

- TS7500 Virtualization Engine for Linux, Unix and Windows systems

- TS7700 Virtualization Engine for System z

- DR550 and WORM Tape

- Tivoli Storage Manager

10 Year TCO Analysis
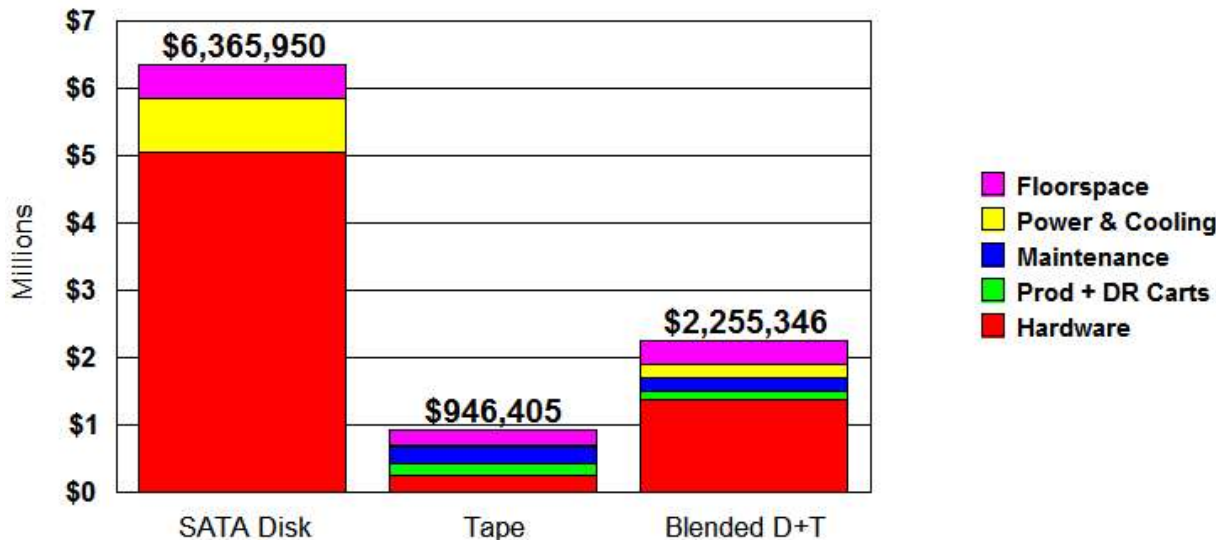
Storage Management Overview
## Optimizing storage infrastructure for business continuity and compliance

Visibility: **View storage capacity, utilization, performance and resource configuration to optimize use and availability**

Control: **Control storage management costs by more effectively leveraging capacity and tiering of information storage resources**

Automation: **Automate data protection and retention based on policies, automate provisioning or configuration changes and automate data migration**

Data Protection

Protect business critical application data ensuring rapid recovery, data reliability and integrity

Prevent legal exposure through data encryption and key management
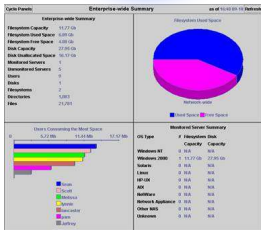
Storage Resource and Infrastructure Management

Enable visibility and automate control through centralized management and automated provisioning
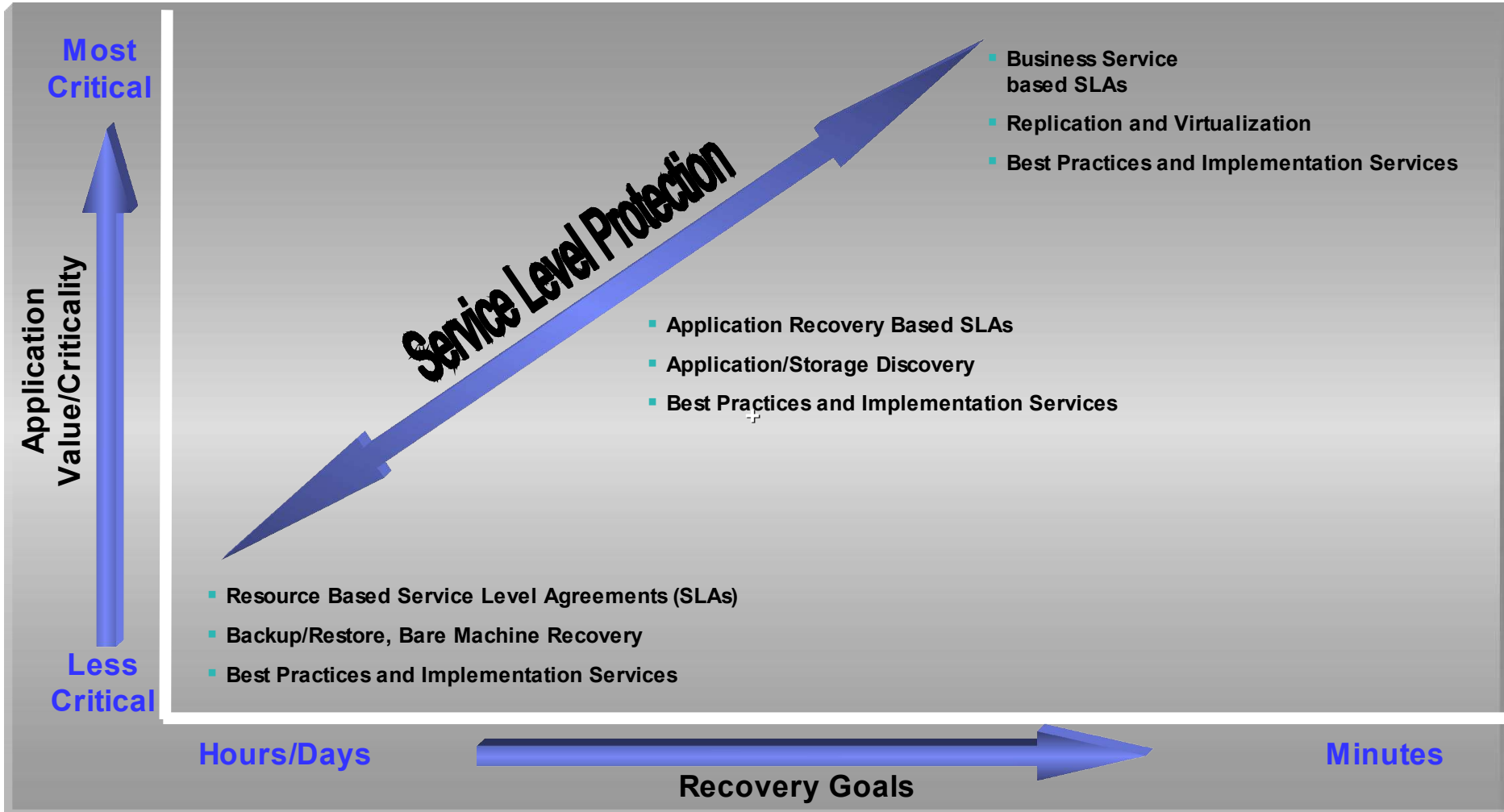
Optimize storage performance and capacity utilization, lowering costs and improving service levels

Information Retention and Lifecycle Management

Keep information at the most efficient and cost effective tier for the current stage of its life

Keeps copies of active or inactive data for long-term storage for regulatory or bookkeeping requirements

Data Protection

Business Continuity for Service Level Protection

Most Critical

Application Value/Criticality

Service Level Protection

- **Business Service based SLAs**
- **Replication and Virtualization**
- **Best Practices and Implementation Services**

- **Application Recovery Based SLAs**
- **Application/Storage Discovery**
- **Best Practices and Implementation Services**

- **Resource Based Service Level Agreements (SLAs)**
- **Backup/Restore, Bare Machine Recovery**
- **Best Practices and Implementation Services**

Less Critical

Hours/Days   **Minutes**

Recovery Goals

IBM and its Partners have capabilities to meet the full continuum of Service Level Objectives

Virtualization takes power efficiency to the next level

- Virtualization creates largest impact to Power/cooling in Data Centers
  - Virtualization improves server and storage utilization which:
    - Reduces the number of servers and therefore, Space, Power, & Cooling required
    - Allows for targeted thermal solutions for efficiencies
    - Allows for more efficient power distribution, backup, and regulation
  - Enables dynamic resource management for
    - Deployment and Operational Optimizations

- Some examples
  - Base Consolidation
  - Policy Based Consolidation
  - Service Oriented Resource Allocation
  - Simplified Technology Transitions
  - Policy Based Provisioning

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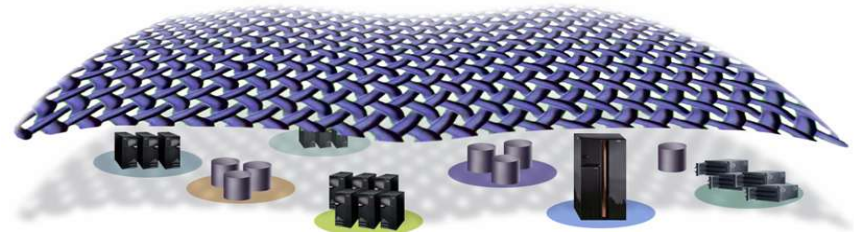
Clients that drive the best results from ILM initiatives focus on 6 best practices

Data Rationalization

Storage Virtualization

Tiered Storage Environment

Information Management

Storage Process, Organization, Technology, and Governance Model
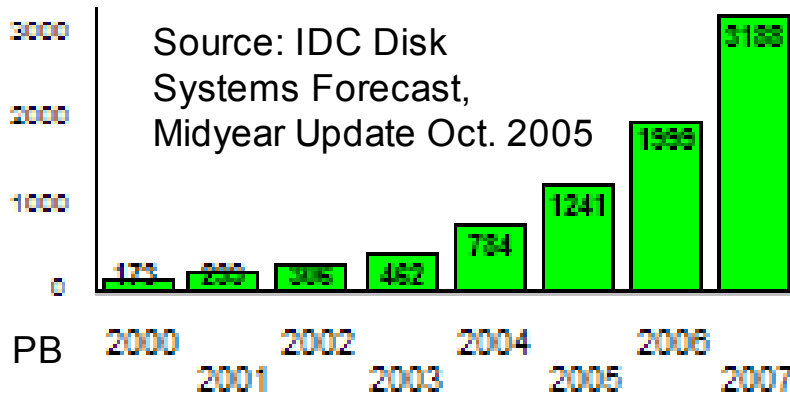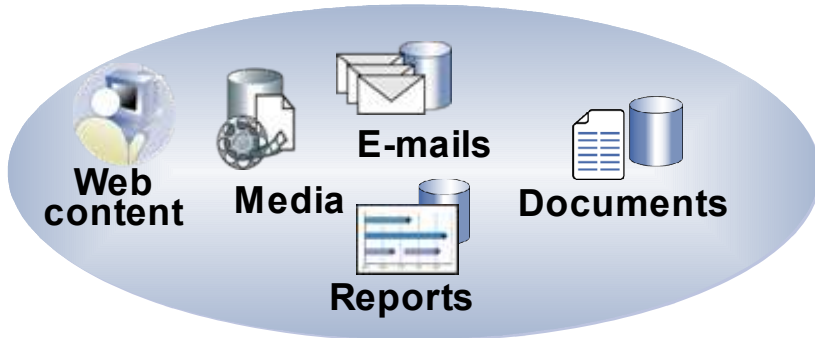
Archiving and Information Retention

✓Cost Reduction & Simplification
✓Improve Efficiency
✓Manage Risk and Streamline Compliance

These things are fundamental to a green storage agenda

Challenges – Variety, Volume, and Velocity

Web content **Media** **E-mails** **Documents** **Reports**

Source: IDC Disk Systems Forecast, Midyear Update Oct. 2005

3000
2000
1000
0

173 256 305 452 784 1241 1959 3188

PB 2000 2001 2002 2003 2004 2005 2006 2007

80% of IT problems are reported by end users

▪ 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. IDC estimates continued 60% yearly growth of new disk PB shipped

▪ 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 users.

IBM

Storage Management Challenges - Real and Growing

Like labour costs, storage management is taking an ever larger share of the budget

Disk storage is growing rapidly
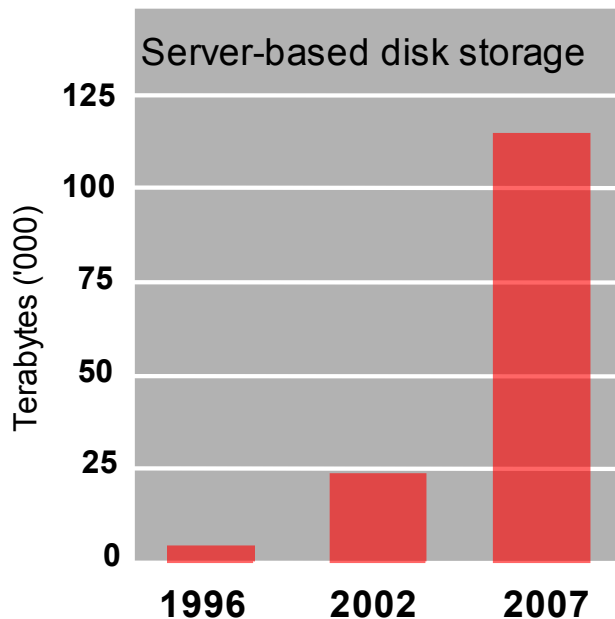
Storage-related expenditures*, as a % of IT budgets, is also growing rapidly

Server-based disk storage — Terabytes ('000): 1996, 2002, 2007

Storage-related expenditures — Percentage (%): 1996, 2002, 2007
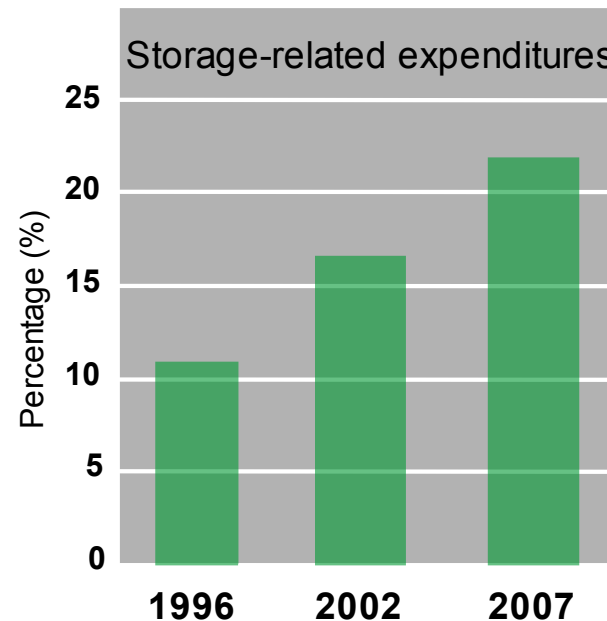
Source: International Technology Group, Sept 2003
* hardware, software, storage networking, personnel, backup operations, recovery, security

Four Fundamental Truths About Data

Different types of data do not age in the same way!
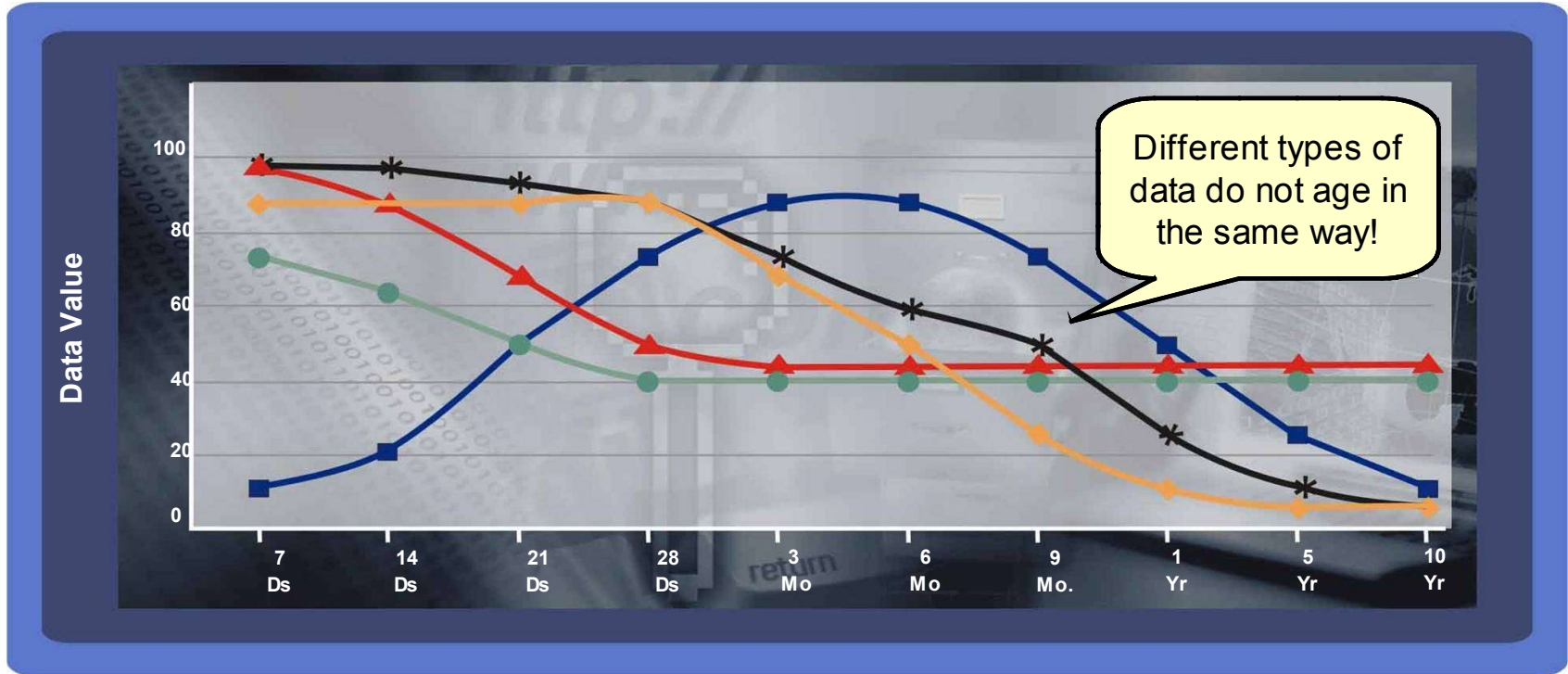
1. All data, when created, does not have equal value

2. Data changes in business value and in service level requirements over time

- IT resources should be allocated according to the value of data

- Data must be managed and leveraged effectively throughout its entire lifespan … *data outlives media*

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Six Best Practices to Consider

|		
Data Rationalization	• Establish groups of valid and invalid data • Determines opportunities to reclaim and consolidate storage	
Storage Virtualization	• Combines physical capacity from multiple storage systems into a single logical storage pool which can be centrally managed	**Information Management Objectives**
Tiered Storage Environment	• Align variable cost hardware types with information classes and classes of services	
Information Management	• Leverage information assets to improve business decisions – offering better access to data integrated across the organization	Reduce Cost and Simplify
Storage Process, Organization, Technology, and Governance Model	• Establish a governance model comprised of process, organization, technology and service management	Improve Efficiency
Archiving and Information Retention	• Enhance systems performance while enabling organizations to better manage risk and streamline regulatory compliance	Manage Risk and Streamline Compliance

The Different Stages in Data's Lifecycle

As data loses its value … it should be moved onto lower cost storage
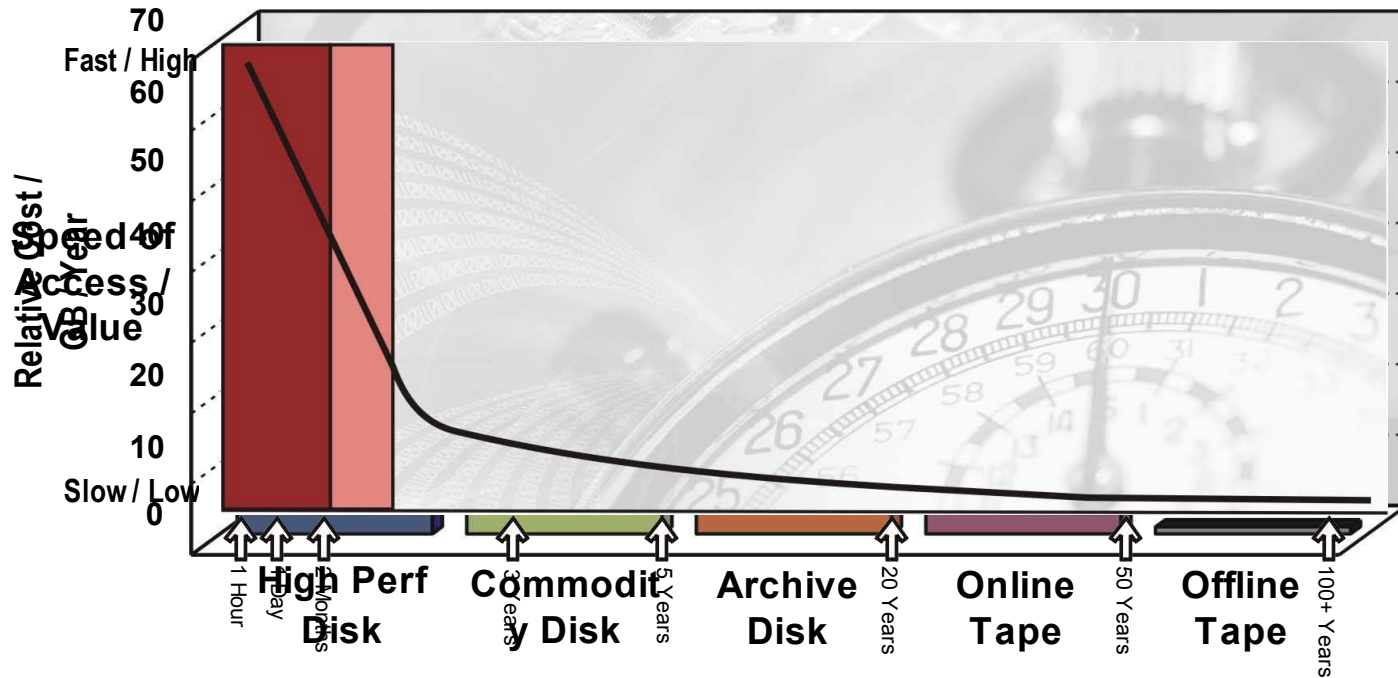
But this should be a well managed process:

- keeping within service management priorities placed on the data by the business, and …
- complying with security, regulatory or other external requirements

The Steps and Components of IBM's Data Lifecycle Management Solution

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The Steps in Data Lifecycle Management

- **Step1: Planning and Assessment**
  - Categorize Data according to its Value
  - Identify, Evaluate, Control & Predict
  - Establish Policies

- **Step 2: Active Data Management**
  - Pooling of storage by class of service
  - Virtualize physical storage
  - Policy based data placement & migration

- **Step 3: Inactive Data Management**
  - Business Continuity & Storage Management
  - Application Protection, HSM & Archiving
  - Long Term Retention for Compliance

Visibility

Know your data

TotalStorage Productivity Center

Control

Manage your data

SAN Volume Controller
Tivoli Storage Manager

Automate

Dispose of your data

Tivoli Storage Manager
Archive Manager & DR550

Data Lifecycle Solutions From IBM

- **TSM**
  - Tivoli Storage Software (world-wide) exceeded market growth for 11 consecutive quarters
  - TSM transactional revenue grew 50% YoY in NE IOT in 2007
  - TSM & HSM is No.1 in the HSM market
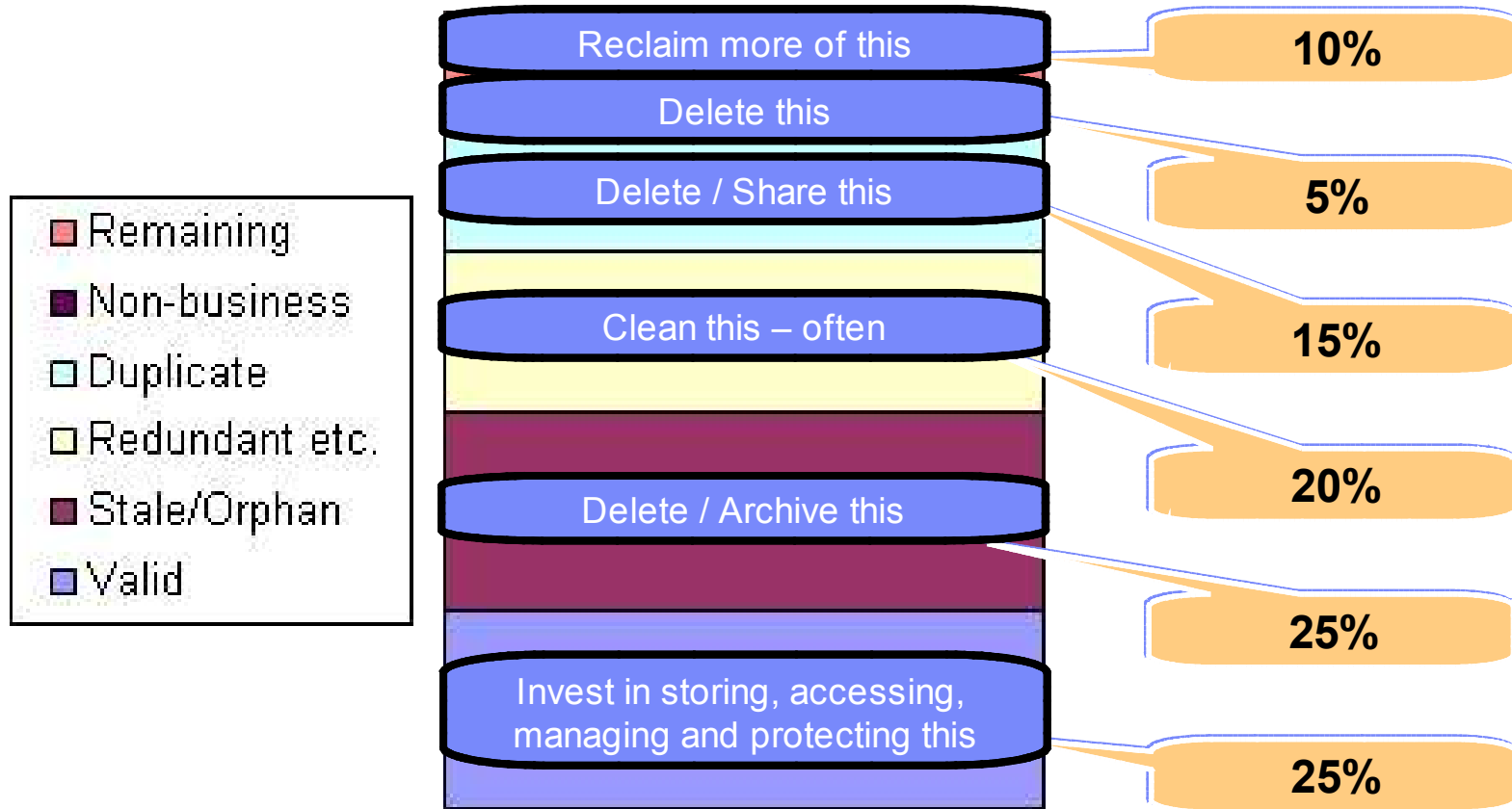 - TSM has been a leading Enterprise class backup tool for distributed systems since its introduction in 1993

- **TPC**
  - TPC is leading the Gartner Magic Quadrant for SRM Tools (March 2007)
  - TPC transactional revenue grew 92% YoY in NE IOT in 2007
  - TPC is built to Open Standards and works with all SMI-S compliant vendors
  - The market is only 20% penetrated
  - TPC CAGR of 35%

- **SVC**
  - Over 10,000 SVC nodes have been shipped since 2003
  - IBM is a leader in virtualised disc arrays
  - SVC transactional revenue grew 79% YoY in NE IOT in 2007
  - Enterprise Strategy Group reports that early virtualization adopters on average *every year* save:
    - 24% on hardware costs
    - 16% on software costs
    - 19% on SAN administration costs
  - SAN Volume Controller demonstrates scalability with the fastest Storage Performance Council benchmark results for any disc controller from any vendor
  - SAN Volume Controller can virtualize IBM and non-IBM storage (over 120 systems from IBM, EMC, HP, HDS, Sun, Dell, NetApp, Fujitsu, NEC, Bull)

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DLM Step 1: Planning and Assessment
Categorize Data according to its Value

Visibility

Legend:
- Remaining
- Non-business
- Duplicate
- Redundant etc.
- Stale/Orphan
- Valid

Category	Percentage
Reclaim more of this	10%
Delete this	
Delete / Share this	5%
Clean this – often	15%
	20%
Delete / Archive this	25%
Invest in storing, accessing, managing and protecting this	25%

By defining information as "categories" or "classes" of data, DLM enables the creation of effective data management standards and policies

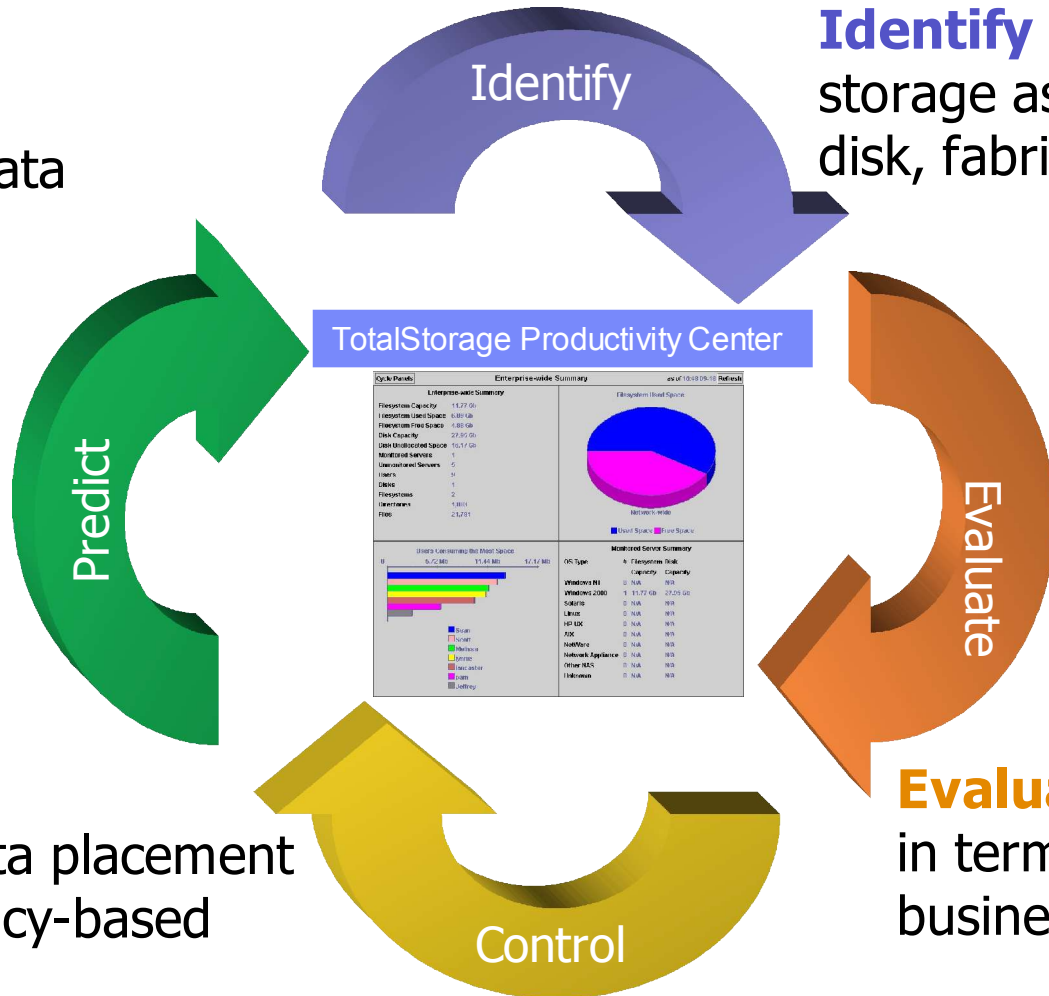# DLM Step 1: Planning and Assessment
Identify, Evaluate, Control & Predict

Visibility

Identify enterprise storage assets (data, disk, fabric, …)

Predict data usage and growth
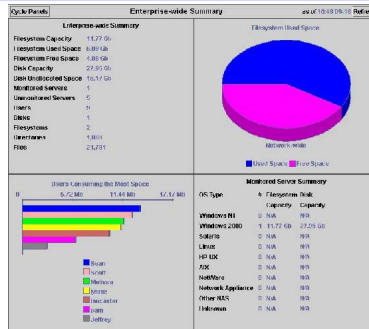
Control data placement through policy-based automation

Evaluate data in terms of its business value

Identify

Predict

Evaluate

Control

TotalStorage Productivity Center

DLM Step 2: Active Data Management
Virtualize physical storage

Control

Make changes to the storage without disrupting host applications

Virtual Disk | Virtual Disk | Virtual Disk | Virtual Disk
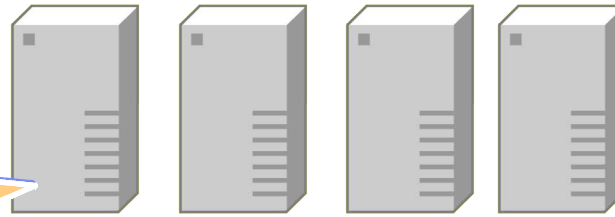
SAN

Manage the storage pool from a central point

SAN Volume Controller

Advanced Copy Services

Apply copy services across the storage pool

Storage Pool

DS8k | HDS | DS4k | EMC | HP
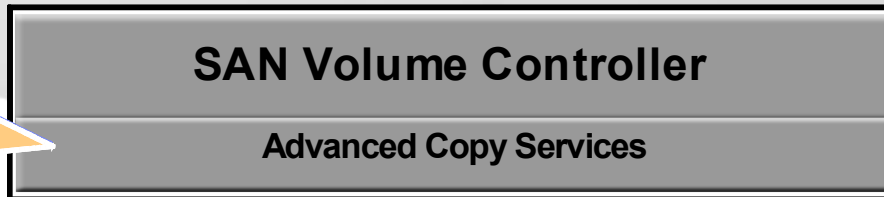
Combine the capacity from multiple arrays into a single pool of storage

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DLM Step 3: Inactive & Active Data Management Automate
Business Continuity & Storage Management

Duplication management

Hierarchy management

Media management

Compress?

Enterprise class

Midrange

anual

Encrypt?

Hierarchy managed by
Tivoli Storage Manager
technology

RM

Assist with compliance management

Vaulting management
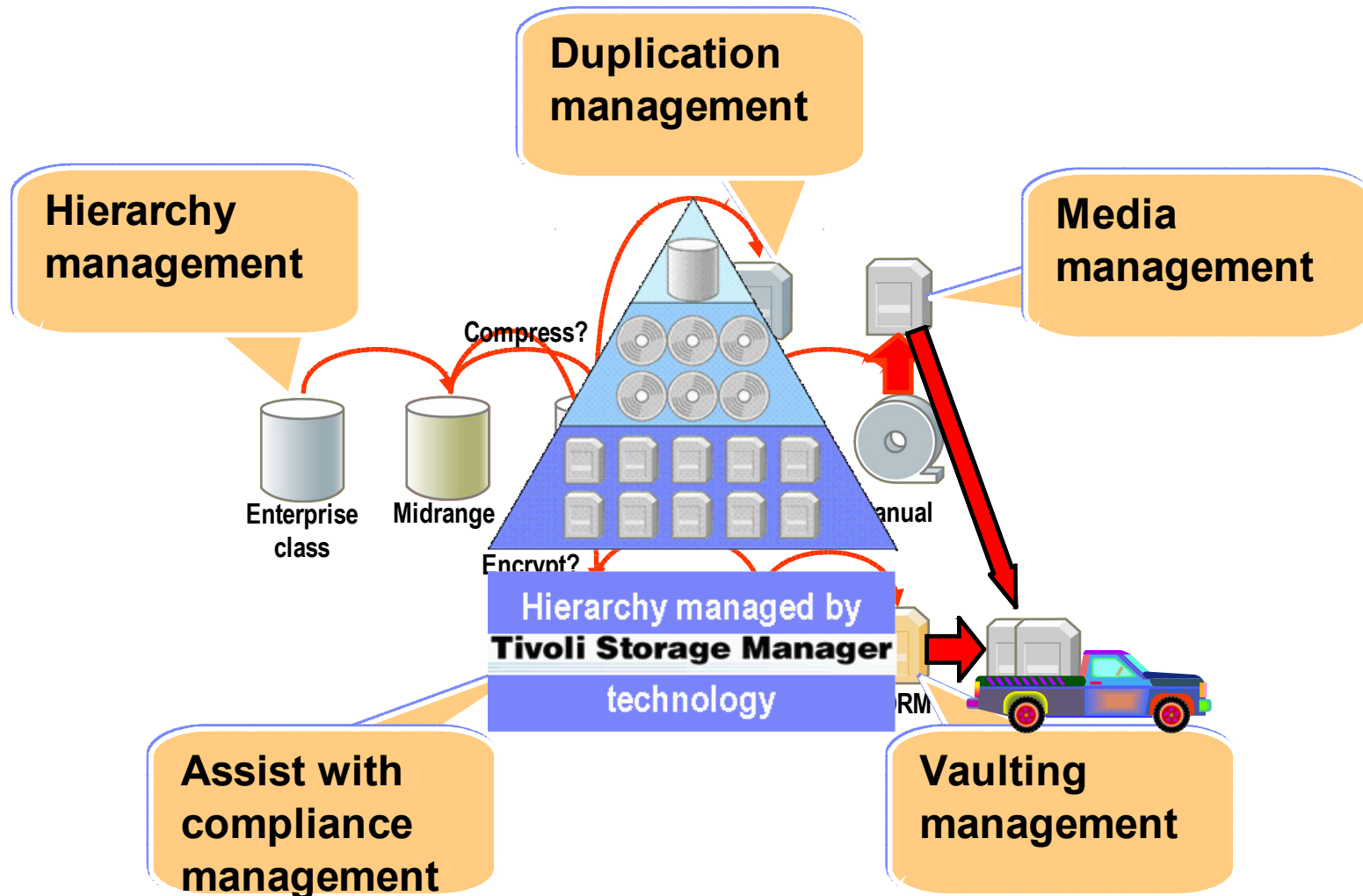
DLM Step 3: Inactive Data Management
Application Protection, HSM & Archiving

Automate

Backup

Application Server

Database

Archive

Mail repository

Backup

Backup

Archive

File system

HSM

SAP instance

Backup

Archive

Backup

Hierarchy managed by
Tivoli Storage Manager
technology
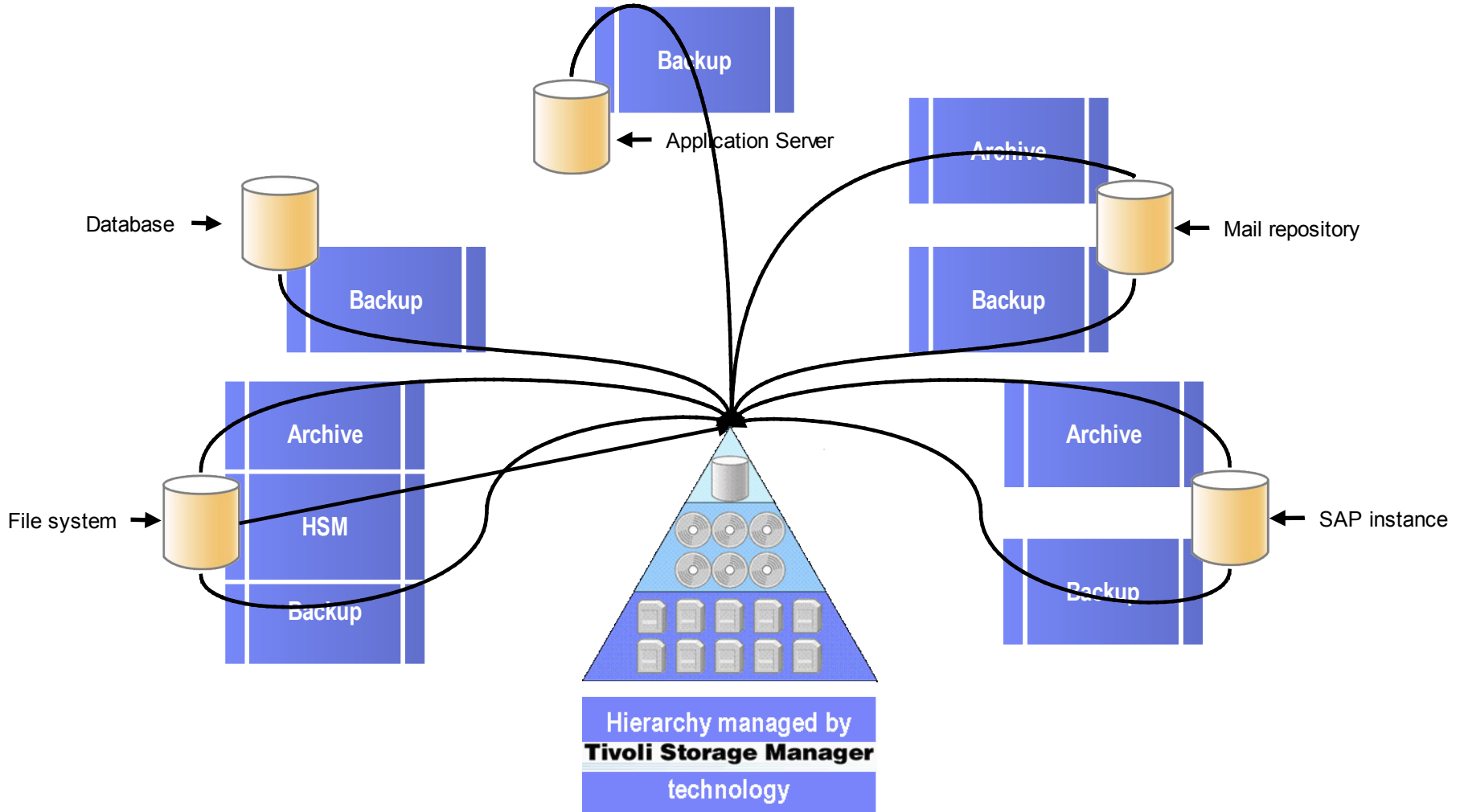
Making DLM Work: Visibility-Control-Automation

Visibility (Data Type)	Control (Policy Engine)	Automation (Movement Engine)		
Database Record	Commonstore / Filenet / Princeton	Content Manager / Commonstore / Filenet / Princeton / TSM		
File	TPC for Data	HSM / Space Manager / TSM		
Volume	TPC for Disk	SAN Volume Controller		
		Tier 1 Disk	Tier 2 Disk	Tier 3 Disk / Tape

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IBM
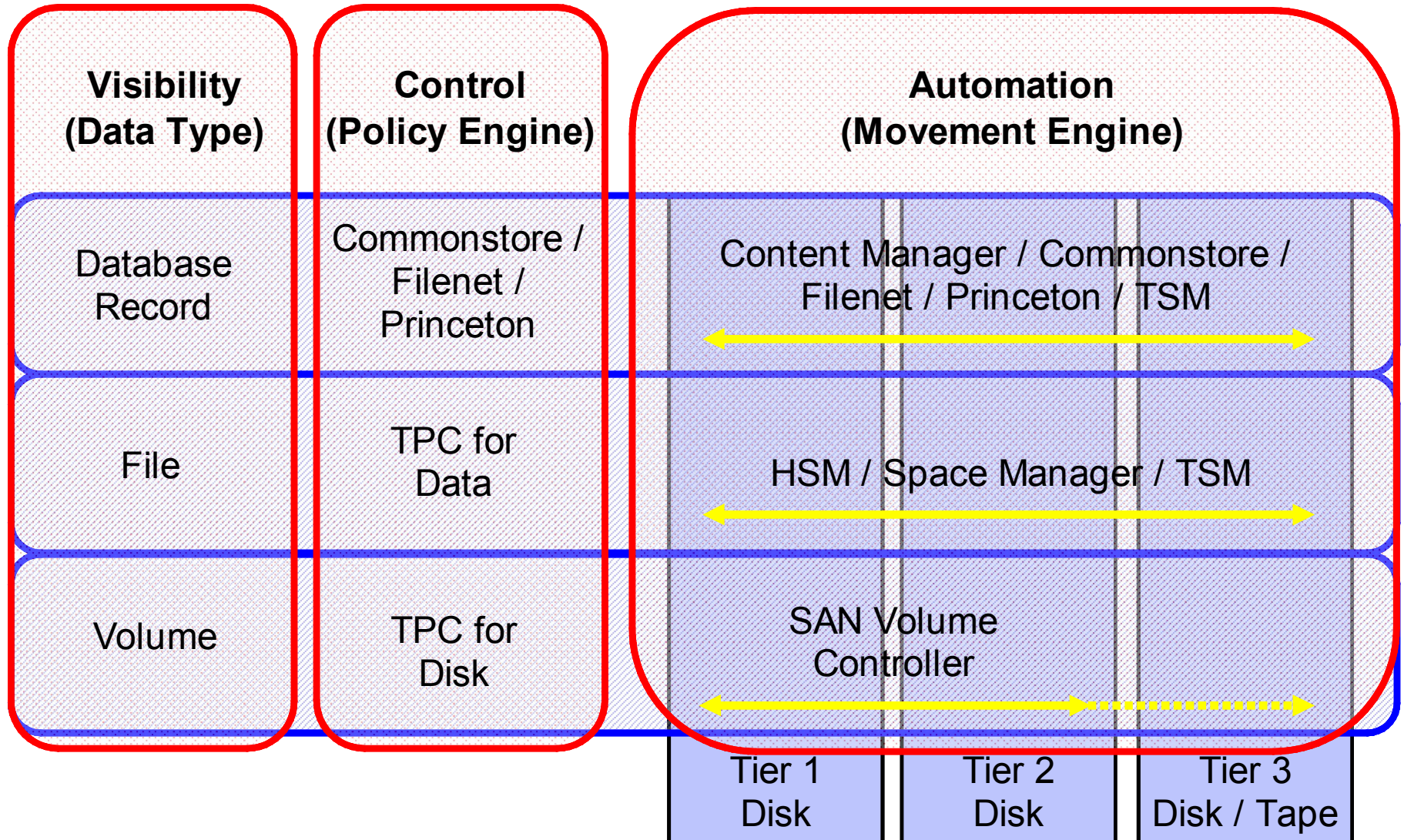
Tying it all together with Service Management

Multiple OSs / DBs / Emails / Apps

Service Level Objectives

Platinum Servers

Service Level Objectives

Gold Servers

Service Level Objectives

Silver Servers

SAN

LAN

Storage Capabilities

Platinum Storage Pool

Storage Capabilities

Gold Storage Pool

Storage Capabilities

Silver Storage Pool

Storage Capabilities

Tape

Enterprise Disk

Virtual Disk

Virtual Disk

Virtual Disk

Virtual Disk

Virtual Disk

WORM Disk

Virtualized Physical / Heterogeneous Storage

Enterprise, Mid–Tier and WORM

Enterprise

Mid-range

Cost Centric

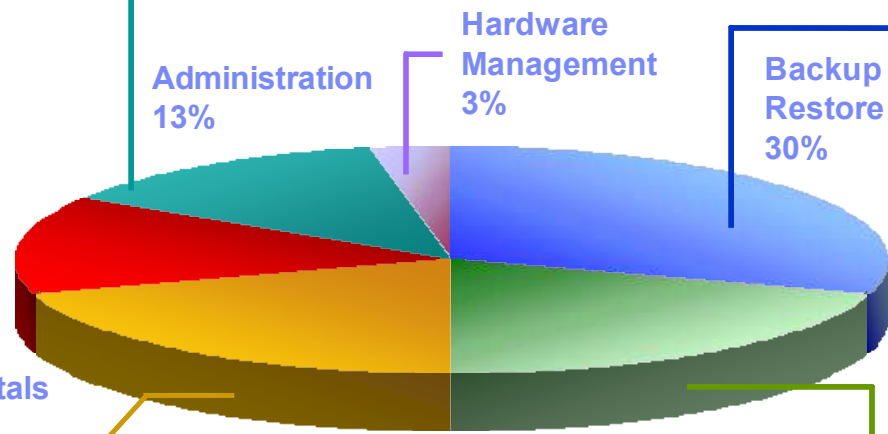# The Business Value of Data Lifecycle Management

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DLM Helps Lower Storage TCO

Average TCO for Storage Systems

Source: Gartner Group

- **Better manage explosive data growth**
- **Simplify storage management across tiers of heterogeneous storage**
- **Reduce time to provision storage**

Administration 13%

Hardware Management 3%

Backup / Restore 30%

- **Monitor and automate backup and archive of corporate files**

Environmentals 14%

Purchase 20%

Downtime 20%

- **Lower hardware costs**
- **Storage resource optimization**
- **Make more efficient storage purchases based on capacity demands**

- **Predict out of space conditions**
- **Detect availability issues in SAN**
- **Monitor SAN and Disk performance hot spots**

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DLM Helps Realize Ongoing Savings

"Hard" Savings:

- **Storage Management Labour Savings:**
  - The reduction in workload for current IT staff managing IT and business systems storage and tasks, and the ability for the staff to scale more effectively

- **Storage Purchase Avoidance:**
  - The reduction in the need for on-line storage through the automatic and intelligent management of company information to near-line and off-line storage resources

- **Tape System Purchase Avoidance:**
  - The reduction in the need for tape system and media through more efficient management of backup and compression technology

- **Network Bandwidth Investment Avoidance:**
  - The elimination of backup window issues, leading to a reduction or elimination of planned network bandwidth improvements to support backup window requirements

"Soft" Savings:

- **Restore Time Benefits:**
  - A reduction in lost business and productivity through faster data restores

- **Backup Coverage Risk Avoidance:**
  - An increase in backup coverage resulting in reduced risk of data loss

- **Increased Availability:**
  - Reduced unplanned downtime for business systems, applications and infrastructure components

Additional Savings:

- **Data Migration:**
  - Migrate data from one device to another without taking storage offline – better reallocation, scalability and upgradability without disruption

- **Competitive Savings:**
  - Cost effective, flexible copy services can replace multiple costly existing tools

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How Are DLM "Hard" Savings Achieved?

## Storage Purchase Avoidance savings are achieved by:

- Identifying unused data that can be archived or deleted, which helps reclaim wasted space and reduces the need to purchase additional storage

- Using hierarchical storage management (HSM) techniques to significantly reduce wasted space in expensive online storage devices by systematically migrating rarely used files according to pre-defined policies

- Treating all storage as a common pool, which greatly improves overall storage utilization

- Supporting multiple storage profiles and advanced copy services, which facilitates the use of less expensive storage for secondary copies

IT Operations Labour savings are achieved by:

- Improving capacity and performance management and planning, by proactively monitoring and enforcing storage usage policies, and by gathering key configuration, network statistics, and other status information

- Simplifying storage asset management through extensive reporting, and helping inventory control and recording by automatically discovering resources

- Easing administration through the use of a central user interface for configuring and managing all supported devices on the storage estate

- Providing monitoring and alerting, provisioning and error prediction capabilities

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Summary

Data Lifecycle Management is a set of Storage Solutions that are perfectly aligned to the IBM Service Management Strategy
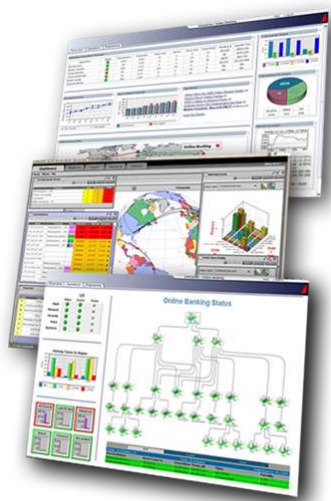
Respond faster and make better decisions

Improve quality and reduce risk

Lower costs and build agility

Enabling customer innovation through Visibility, Control, and Automation

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