



DISC Archiving Systems

www.disc-group.com

The Future of Archiving Today

Agenda

- DISC Archiving Systems
- Archive Storage Market
- Technology
- DISC Products
- Positioning
- Markets
- Business Partners
- Summary



DISC Archiving Systems



- **Market Leader in Hybrid Archive Storage Systems**

DISC provides integrated, value-added solutions with a focus on protecting the long-term technology investments of clients by ensuring quality, reliability and value

- **Long history and Experience**

- Originally formed in 1952 as NSM Music Jukeboxes.
- **DISC** = **D**ocument **I**maging **S**ystems **C**orporation was founded, introducing its first optical storage library in 1990
- Merger with NSM in 2001, Merger with DAX Archiving Solutions in 2009
- Over 22.000 installations worldwide

- **Best-in-class German Engineering & Production**

- Long history and reputation for highest quality and reliability
- Investment in future-proof technologies

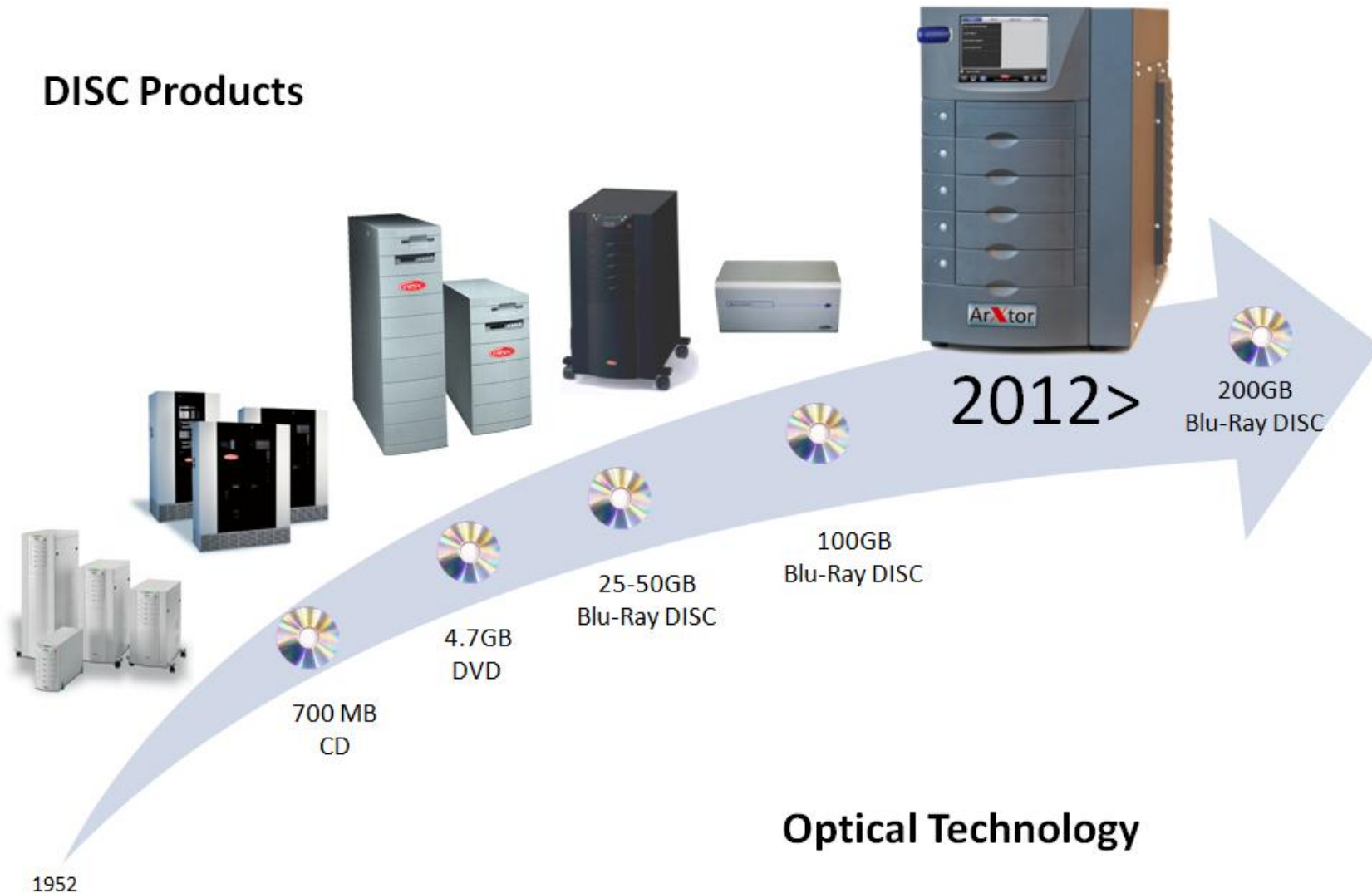
- **Headquarters in Haarlem, The Netherlands**

- Production in Bingen, Germany
- North America Sales office in Denver, Colorado, USA
- Worldwide network of resellers and support partners



DISC Archiving Systems

DISC Products



Archive Storage Market & Strategies



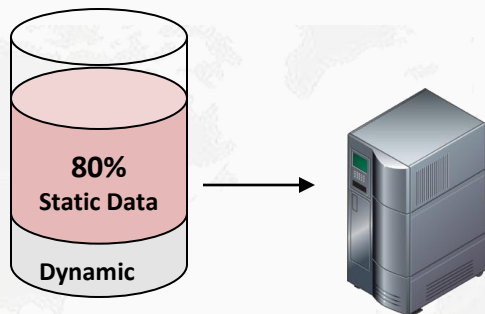
Volume of digital content grew 48% to **2.7ZB** in 2012,
going towards **8ZB** in 2015

The successful collection, analysis and use of the zettabytes of world digital data, represents the largest challenge for companies and the next frontier for
Innovation, Competition & Productivity

	REALITY	TREND
80%	of corporate data is fixed content and has not been accessed recently and 60% of this data will never be accessed	⇒ Growing share of inactive data
80%	of this data still resides on primary storage	⇒ Extra storage capacities needed
40%	of data center power is used for storage	⇒ Increasing energy costs
50%	of IT Managers' time is spent on managing fixed content and every 3-5 years unnecessary data migrations are performed to cope with this data growth	⇒ Unnecessary technology refresh and data migration costs/risks



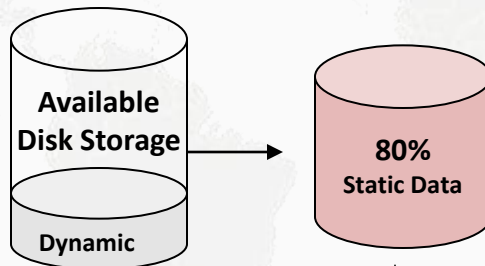
Archive Storage Market & Strategies



Strategy 1: Short-term capacity expansion

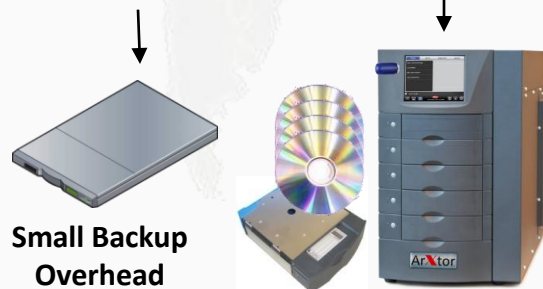
- Enlarge storage capacity by adding extra HDD
- Frequent technology refresh (3-4 yr.) and data migration
- Costly, inefficient storage management risking data loss

- Limited on-line disk storage available
- Large backup: 80% static data included in daily back-up
- All data remains on spinning disk, exposed to viruses, error etc.
- High energy, cooling costs



Strategy 2: Long-term capacity expansion & archive

- Archive all non-changing static data
- Technology refreshes only on active data
- No data migration required, long term archive



- All static data gets archived automatically
- Primary storage and backup are relieved and easier to manage
- WORM data archive storage provides protection and compliance
- 95% operational costs reduction (power, cooling, maintenance, technology refresh, data migration, acquisition)

Exponential
Data Growth
and Growing
Share of
Static Data

Archive Storage Market & Strategies

- **Market Trends**

- Virtualisation and centralisation of IT - Cloud
 - Shared storage resources with data centres
- Remote faster connections
- Low Energy Consumption, Sustainable/Green Solutions
- Larger and smaller capacities

- **DISC Roadmap**

- Libraries more intelligent
 - Integrating server into library
- Libraries more connectable
 - iSCSI, for remote and virtual environments
- Libraries more configurable
 - Rack mount scalable modules
- Libraries more reliable
 - Advanced serviceability and diagnostics



DISC Products

DISC BD Series

- Scalable Automated Blu-ray Library Solutions
- 100GB/50GB/25GB Blu-ray Disc Media
- SmartPack Removable Media Technology
- LVD/SAS Connectivity
- Models: Library Solution



DISC ArXtor Series

- Scalable Automated Blu-ray Library & Hybrid Appliance Solutions
- 100GB/50GB/25GB Blu-ray Disc Media
- SmartPack Removable Media Technology
- Models:
 - ArXtor Lite – Library Solution
 - ArXtor Appliance – Appliance Solution
- iSCSI Connectivity
- Front-Panel Touch Display
- Web Client (java)
- USB Security Certificate Dongle
- Mobile App



DISC ArXtor Series: Hybrid Storage Technology



Best of
Blu-ray

Best of
Disk



ArXtor1000 Appliance
front view

Blu-ray Disc Technology
Near-line/off-line WORM Archive Storage

Middleware 3rd Party Software
Library Management/ILM Applications

RAID Technology
On-line Storage/Storage Virtualization



ArXtor1000 Appliance
rear view

Long-term Archive Storage Solution based on HDD Cache with Blu-ray Optical Library

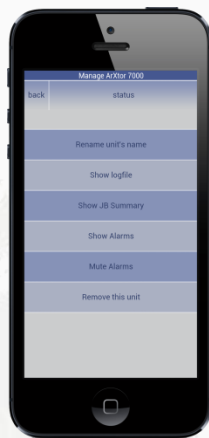
- ✓ Combine hard disk (speed) with durability of Blu-ray Archive Storage
- ✓ Intelligent Libraries & Network Attached Appliance Solutions
- ✓ Excluding 3rd Party Software for Library Management/Storage Virtualization



DISC ArXtor Series: Next Generation Technology

Key Benefits

- Low cost near-line active archive, requiring fewer data migrations
- Compliance with legal and corporate regulations
- Secure long-term storage of data, reduces need for backup
- Low TCO & Green Storage Technology offering lowest data storage energy consumption available today
- File and Forget thanks to 50+ year Blu-ray media life and UDF media format can be read on any platform



Key Features

- Simple iSCSI Connectivity
- Standard Network Access (CIFS, NFS, HTTP)
- Touch-panel Display, Java web client and Mobile App, facilitating intuitive diagnostics on the library as well as over the network
- Easy to integrate into any architecture: ArXtor Lite & ArXtor Appliance Models include a complete range of scalable Blu-ray archiving solutions
- Virtual Capacity with SmartPack Removable Media Technology offering infinite off-line media storage

DISC ArXtor Series - Capacity



System	ArXtor 7000	ArXtor 4000	ArXtor 1000
Capacity	51TB – 66TB	14.5TB – 37TB	1.5TB – 10.5TB
Slots	510 -660	145-370	15 – 105
Drives	2 - 10	2 - 6	1 – 2
HDD 2.5"*	Max. 8	Max. 8	Max. 8

** ArXtor Appliance only: Standard configurations include 5 or 8 hard disks (RAID 6 Configuration).
Other configurations available on request.*

DISC ArXtor Series - Models



ArXtor lite

- Intelligent Blu-ray library with easy iSCSI connectivity to any (virtual) server environment.
- Ready to use system with native OS support for iSCSI. Requires 3rd party library management software.
- Upgradable to ArXtor Appliance.

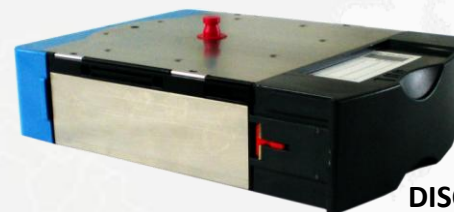
ArXtor appliance

- Complete solution of customizable Blu-ray Appliance with embedded server and easy iSCSI connectivity
- Open system providing a virtual computing environment that can be configured custom-made. Requires 3rd party library management software.
- Optional hard disk storage expansion

** Appliance only*

DISC SmartPack™ Technology

The SmartPack™ Removable Media Technology offers simple and secure long-term archiving of optical media. Each SmartPack™ can hold 15 media and is inserted into one of four locations on the front of DISC libraries.



DISC SmartPack
(720 gr. 5.25")

Maximum Protection

- In and outside of the library
- Enclosed design to ensure protection against scratches, dust, fingerprints, shock and light
- Media locked into place

Easy Media Handling

- Inserted into one of four locations in the front of the library
- Uses same tray system as libraries
- Hot swappable exchange whilst the library is operating

On/Offline Data Mgt.

- Worldwide unique serial number & bar code stored on label and on smart memory chip
- Unlimited Offline Media Storage
- Light weight ergonomic design

DISC Positioning: Tape vs. Blu-ray

- Tape is great for backup, not for archive storage
- Tape has the following disadvantages:
 - Slow access times, around 60-80 seconds. Archives require individual file access, tape is designed to stream data
 - Tapes need management to prolong life. Regular re-spooling is required
 - Limited backward read compatibility.
Only two generations, LTO5 can't read LTO3
 - Tapes are fragile
 - IBM recommend 16-25°C, and replace if dropped
 - Only 20,000 load cycles – or individual file reads
 - Frequent technology refreshes and costly data migration required every other generation: 7-10 years

Archiving Technologies Compared	HDD	LTO	Blu-ray
Lower cost than existing primary storage	✓	✓	✓✓
Long-term retention	✗	✗	✓✓
Compliance with regulations	✓	✓	✓✓
Transparent access to archival information	✓	✗	✓✓
Offline management of very old information	✗	✗	✓✓

DISC Positioning: Hard Disk only vs. Blu-ray



- RAID is great for transactional data storage, not for archive storage
- RAID has the following disadvantages:
 - Enterprise RAID is expensive
 - Expected to fail, hence the Redundant Array -RAID
 - Must be backed up
 - Limited life, 3-5 years: Frequent technology refreshes and costly data migration required every 3-5 years
 - High energy consumption, every year!

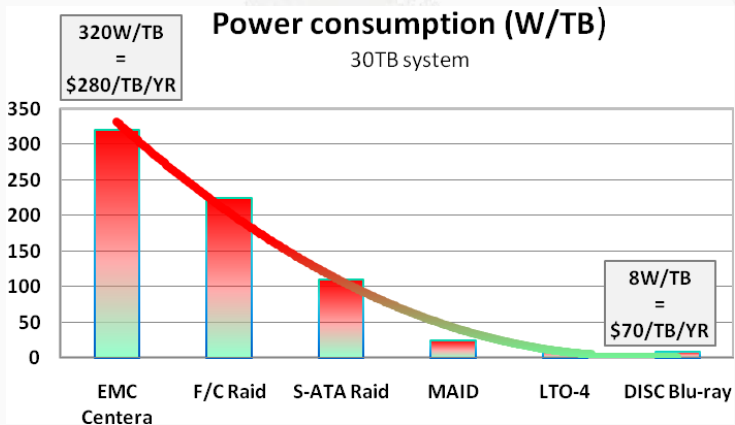
TCO COMPARISON: 50TB Enterprise Hard Disk vs. 50TB Blu-ray Appliance						
Period	5-Year TCO		10-Year TCO		15-Year TCO	
COST/TECHNOLOGY	HARD DISK	BLU-RAY	HARD DISK	BLU-RAY	HARD DISK	BLU-RAY
Acquisition	\$93,000	\$73,000	\$93,000	\$73,000	\$93,000	\$73,000
Maintenance	\$51,500	\$43,900	\$61,800	\$98,800	\$63,500	\$153,700
Power & Cooling	\$53,200	\$5,300	\$106,500	\$10,600	\$159,700	\$14,000
Technology Refresh	\$46,600	\$0	\$68,000	\$6,700	\$69,900	\$6,700
Data Migration	\$39,900	\$0	\$119,800	\$0	\$159,700	\$0
TOTAL	\$284,200	\$122,200	\$449,100	\$189,100	\$545,800	\$247,400



DISC Positioning

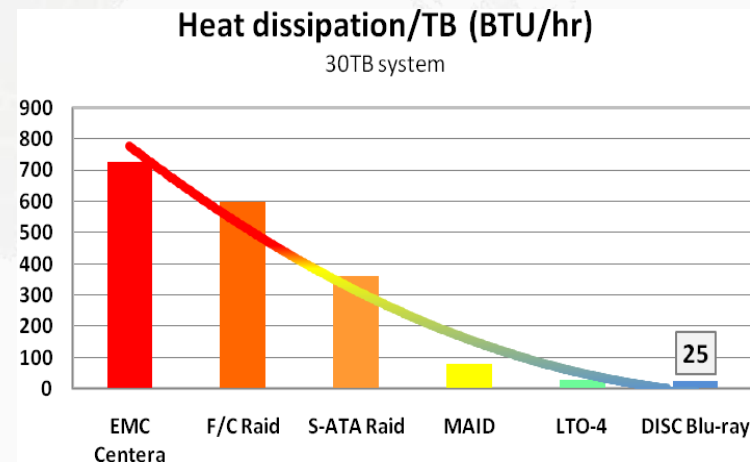
Magnetic Storage – Soft Archive

- Migrate archive
- Mechanical drive
- Short life (migration requirement)
- Continuous power requirement
- Air conditioning requirement
- High carbon archive



Optical Storage – Hard Archive

- Physical archive
- Solid Media (no MTBF)
- Long life (no migration requirement)
- Low power requirement
- Low/no air conditioning requirement
- Low carbon archive



DISC Positioning

- 100GB (UDF) Standards Based Media
 - 50+ Year Media Life
- Successor of CD & DVD;
 - 30+ year backward compatibility
 - Supports Rewritable & Write-once Media
- Long-term Readability Provided by Standardization, Long life media, Mass market Acceptance & Usage
- DISC Archiving Systems is a member of:
 - OPARG Group (Optical Archive Group)
 - Blu-ray Disc Association



Market Sectors

Archival storage is suitable for all markets that require long term storage of valuable data. Key market sectors and partners include:

Document Management

Numerous small documents/images are scanned , indexed and need to be restored for future use. Numerous DMS recommend DISC solutions: Docuware, Easy Software, Kofax, LaserFiche, Saperion...

Healthcare

Images reviewed by doctors and stored for future comparison or longitudinal research studies. Network and direct attached to PACS. Widely deployed with healthcare partners including including Agfa, GE Healthcare, Siemens...

Law Enforcement

Surveillance information that is collected for evidential purposes ,CCTV, telephone conversations and records. Data stored directly to media via ISV software. Numerous law enforcement solution providers recommend DISC solutions: PenLink, JSI, Verint,Milestone Systems, ETI, Soleratec...



Market Sectors

Banking / Finance

Financial records and transactions are archived for regulatory compliance. WORM and secure storage make Blu-ray ideal. Typically deployed as a file based archive repository. Utilizes a wide variety of ISV middleware software. Ranging from simple library management to sophisticated automated policy-based storage management capabilities. Used in major banks world-wide: BofA, Citibank, Deutsche Bank...

Museums / National Archives

Rich content information that is required to be preserved for posterity. Scanned copies of historical documents and increasing digital content Available over a network/internet for researchers or general public. Museums, libraries throughout the world including Hong Kong Central Library, Dutch National Museum...

Broadcast / Post-Production

Traditionally video tapes were used to record raw material and kept as an archival copy of the footage. However, as recording becomes fully digital and tapeless, archiving long term footage becomes a disruptive issue. All material from major editing platforms, camera's and archive media can be archived.



DISC Installations

Industry, Trading, Logistics

Lockheed Martin
Boeing
Eastman Chemical Corporation
Lufthansa Airlines

Sony
AT&T
Walt Disney

Motorola
Daimler Chrysler

Bosch

BASF

VW

BMW

Fiat

Danfoss

Walmart

Gazprom

R & D

Forschungsinstitut Karlsruhe
Horticultural Institute UK
MIT
German Universities
Texas University of Dallas

Legal

Department of Justice
Latham & Watkins

Banking

Federal Reserve Banks
1st National Bank
Brandes Investment Partners
Moody's
Deutsche Bank
Fortis
Bank One
Chase Manhattan Bank
Lloyds Bank
Sermepa
Banque Populaire Pyrénées Orientales
Nordea
ICBC

CBC

CMBC

CEBB

Publishing

R.R.
Donnelly
Edipresse
Polaroid
Agfa
Barco
Sports Illustrated

Insurance

Allstate Insurance Company
Prudential Services
NY Life
First American Title Insurance
Commercial Union Insurance
Metropolitan Life
Allianz
Versicherungen



Medical

VA Hospitals
Columbia Regional Medical Center
UCSF Medical Center
DeKalb Genetics
Siemens Medical
University of Geneva Hospital
University of Beijing
University of Heidelberg Hospital
Beijing Hospital

Law Enforcement

GE
London City
US Congress
Las Vegas Police

Government

National Security Agency (NSA)
NATO HQ (D, NL, GR, N)
U.S. Navy
NASA
U.S. Department of Energy
UK Ministry of Defense
UK Royal Navy
Deutsche Bundeswehr
Australian Dept. of Defense
Hong Kong Library
State Museum Horn, Den Haag

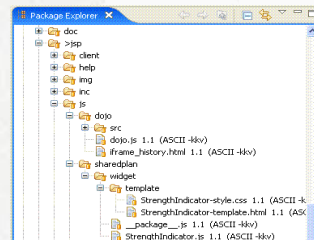
DISC Partnerships – SW & HW



- **DISC Works Closely With Hardware & Software “Middleware” Partners to Deliver Certified, Integrated Optical Archive Solutions**
 - Automation-ready Panasonic & LG Blu-ray optical drive technology
 - DAX, OSS, PoINT, QStar, StorageQuest & others for turnkey NAS/DAS solutions



- **Simple Drag-n-Drop Library Management**
 - CIFS/NFS mount point(s), UNC path/mapped drive letter(s)
 - Library/Media partitioning
 - File/Media Spanning
 - UDF file system
 - Offline file/media management



- **Sophisticated ILM/Tiered Storage Management**
 - Policy-based, multi-tier file/data management (DAS/NAS/SAN>Tape>Optical)
 - Mirroring, Active/Passive, Active/Active DR
 - Tight integration with Applications, Active Directory, MAM, etc.



DISC Partnerships – Distribution/Service



- **Sales Through Worldwide Channel Partners**

- Two-tier via Reseller Channel:
Value-Add Distributors (VADs) & Value-Add Resellers (VARs)
- Solution Providers/System Integrators
- OEMs



- **Worldwide Service & Support**

- 1st line support handled by DISC expert Engineers
- 2nd line support handled by certified DISC OEM's, Solution Providers & 3rd. Party Hardware Service Providers
- Escalations Handled Directly by DISC



Summary: Why DISC Library Automation?



Customer Requirements for Long-Term Storage vs. DISC Product Features

1. Long-term	With a 50+ Year Blu-ray Archive Grade media longevity and a future-proof modular architecture, there is no need for costly technology/data migrations.
2. Standard	A standard file system, a standard media format and non-proprietary HDD/Blu-ray technology allow seamless integration into any standard or GigE network.
3. Reliable	The enterprise class replaceable components and robust robotic maintenance free media picker facilitate steady and fast media movements.
4. Immutable	Blu-ray Media Technology offers intrinsic hardware level WORM Compliance and meets international regulatory compliance requirements.
5. Access	Transparent random access is facilitated by the use of standard network protocols, simple iSCSI connectivity access and Blu-ray Media Technology
6. Portability	Removable SmartPack Media technology and (Blu-ray) Universal Disc Format (UDF) provide maximum portability and infinite off-line media storage.
7. Green	Offering 66 TB in a 35U rack, the ArXtor Series consume less than 8 watts/TB capacity energy while off-line data management requires no power/cooling.
8. Service	Intelligent front-panel touch display, Web GUI and Mobile App facilitate intuitive and valuable local and remote (Java client) diagnostic capabilities and remote support.
9. Low TCO	Significant savings in technology refresh, data migrations, power, cooling etc.
10. Scalable	A range of frame sizes and capacities are available in 11U/23U/35U in rack-mount and free-standing pedestal configurations.



Summary: Why DISC?



- **DISC delivers highest quality & next generation archive systems**
 - Engineered & produced in Germany
 - Providing immediate TCO savings & future-proof roadmap
- **DISC Solutions are applicable to all archive storage needs**
 - Integration with numerous software & OEM partners
 - Offering long-term, compliant archive storage strategy
- **DISC works with local partners providing**
 - Marketing support and regional sales leads
 - Worldwide service and technical support



DISC Archiving Systems

Thank You



The Future of Archiving Today

www.disc-group.com

©DISC Archiving Systems