Digital Preservation Storage Media Requirements: Thinking Beyond the Media

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Enterprise data storage media available March 2026

Technology	Approx year released to market	Age today
Spinning disk (hard drives)	1987 (first 1TB in 2009)	39
NAND (SSD)	1991 (20MB for $1000!)	35
Data tape (IBM 3592)	2003	23
Data tape (LTO)	2000	26

*** Dates drawn from the Computer History Museum website:**
https://www.computerhistory.org/timeline/memory-storage/

We needed a new **commercially viable** and **widely adopted** data storage medium **yesterday.**

New data storage media possibilities today

Technology	Approx. year dedicated efforts began	Age today
Piql	2010	16
DOTS	2010	16
DNA (in general)	2013	13
SPhotonix	2017	8
Microsoft Project Silica	2017-2025	8 and done?
Cerabyte	2022	4

Givens: Shared physical storage media attributes

Media endurance. The developers all promise the physical media will **endure** hundreds to thousands of years.

Environmental sustainability. The actual physical **media** are **environmentally sustainable** (DNA, glass, ceramic, metal alloys, aluminum, plastic).

- *The Scope 3 emissions (embodied carbon) to manufacture the media and write/read the data are unknown.*

Givens: What enterprise consumers want

- Speed (writing, reading)
- Low cost
- Easy

New data storage media considerations *beyond* the physical media (a digital preservationist's perspective)

1. Standards body/alliance/consortium supporting development.
2. More than one entity developing the technology.
3. Interoperability: a storage system using the same technology can read data written on a competitor's without special plug-ins/add-ons.
4. Random access.
5. Write Once, Read Many (WORM)
6. Non-hyperscaler customer can own the hardware to encode/decode data themselves (own the means to write/read & control their own data).
7. Wide acceptance and adoption.

Compute would be nice, too.

Today’s storage media is being burned up because of computational processes, not storage.

Active digital preservation involves processes, flavored with neuroses.

- **Fixity checks**. How do we know the data written to the new storage media has not changed without scheduled fixity checks? How do we know it was written correctly? We are asked to trust the storage, which goes against ingrained experience. Vendors need to offer enough proof to change this human mindset.

- **Preservation systems**. Need our own digital preservation systems on the front end for capturing preservation metadata, before the data is written to storage.

Format obsolescence

The storage media might be viable in 500 years, but the data stored on it might not be.

Because of obsolescence factors, digital objects/files could be transcoded over time into more viable formats as needed. Archivists need to:

1. retrieve specific obsolete files (random access)
2. transcode them
3. copy new versions to storage
4. flag the original as obsolete, and there's an updated format version

…. tracking all actions and relationships in a digital preservation system.

Digital preservation can’t be “store and ignore.”

It is an ongoing, active process.

Contact

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