Why Not DOTS?

& The AI Threat to Data Provenance

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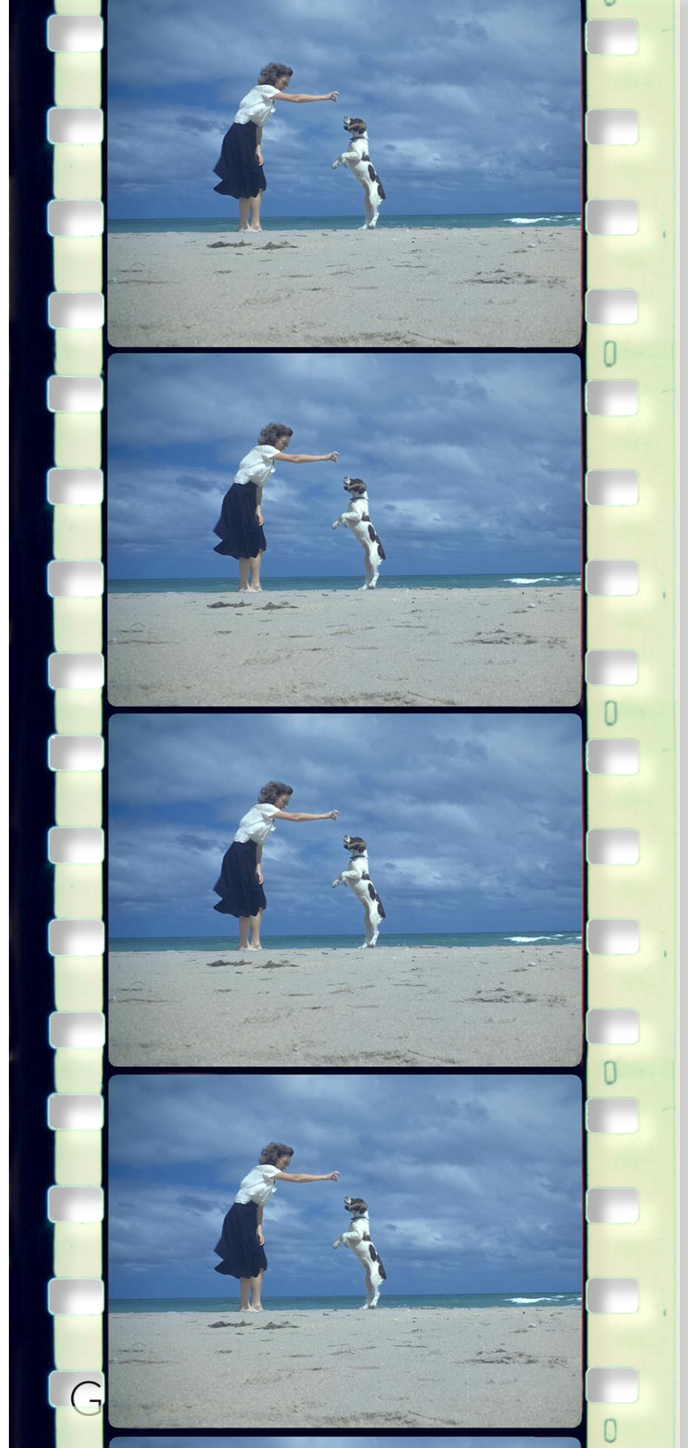
FIRST

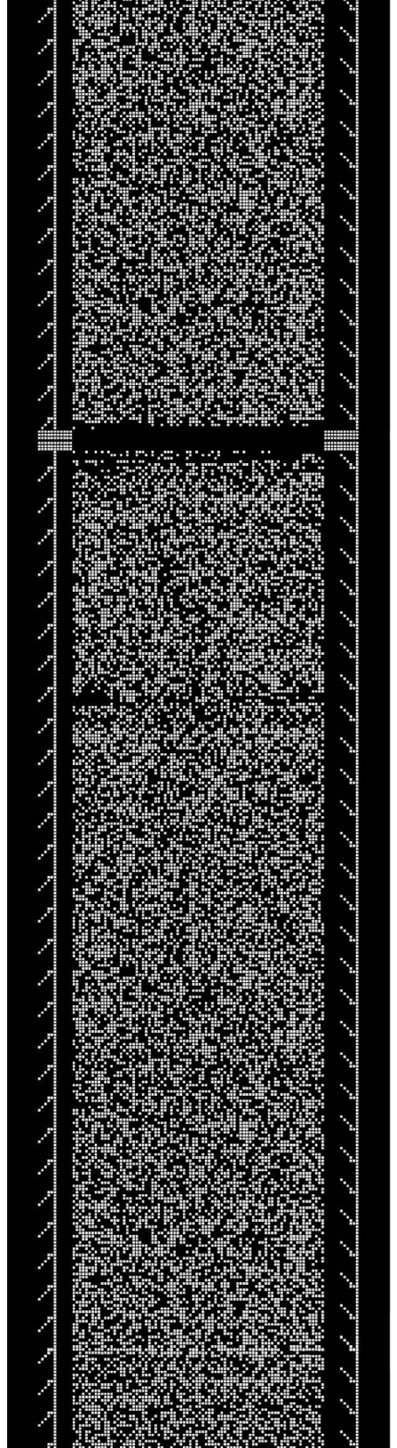


Let’s Talk About a Proven Archival Media

- Film is simple to interpret
- Reading the media is non-complex
- All that’s needed to read the information is light, and a lens
- Even a human can interpret the information
- We know how to store it properly, and under the right conditions, can last over 100 years
- Even if it’s stored *improperly*, it’s surprisingly robust
- Film has been around for over 120 years
- Any mechanically inclined person could build a device to read the media

The Downsides of that Proven Archival Media

- When it comes to storing data on film…
- Data recorded must be larger than the noise of the film grain
- Both Technicolor and Kodak discovered over 200,000 feet of 35mm film needed to record the data for 8 Terabytes
- A stack of 120 2,000-foot reels over 12 feet tall
- It does require stringent storage conditions
- Future availability of photosensitive film emulsion



DOTS is Similar to that Proven Archival Media

- DOTS is simple to interpret
- Reading the media is non-complex
- All that's needed to read the information is light, and a lens
- Even a human can interpret the information, with sufficient magnification
- DOTS has been around for 30 years
- Carnegie Mellon University accelerated life testing concluded 200 to 2000 years viability for the media
- Any mechanically inclined person could build a device to capture the information

DOTS Improves Upon the Downsides of Film

- A single 12” reel of ¾” wide DOTS media can store 20 TBytes (vs. 120 reels for 8 Tbytes)
- Over 37 TBytes in a single 12” reel that is 35mm wide
- Store anywhere from -6 to 66º C, at any humidity

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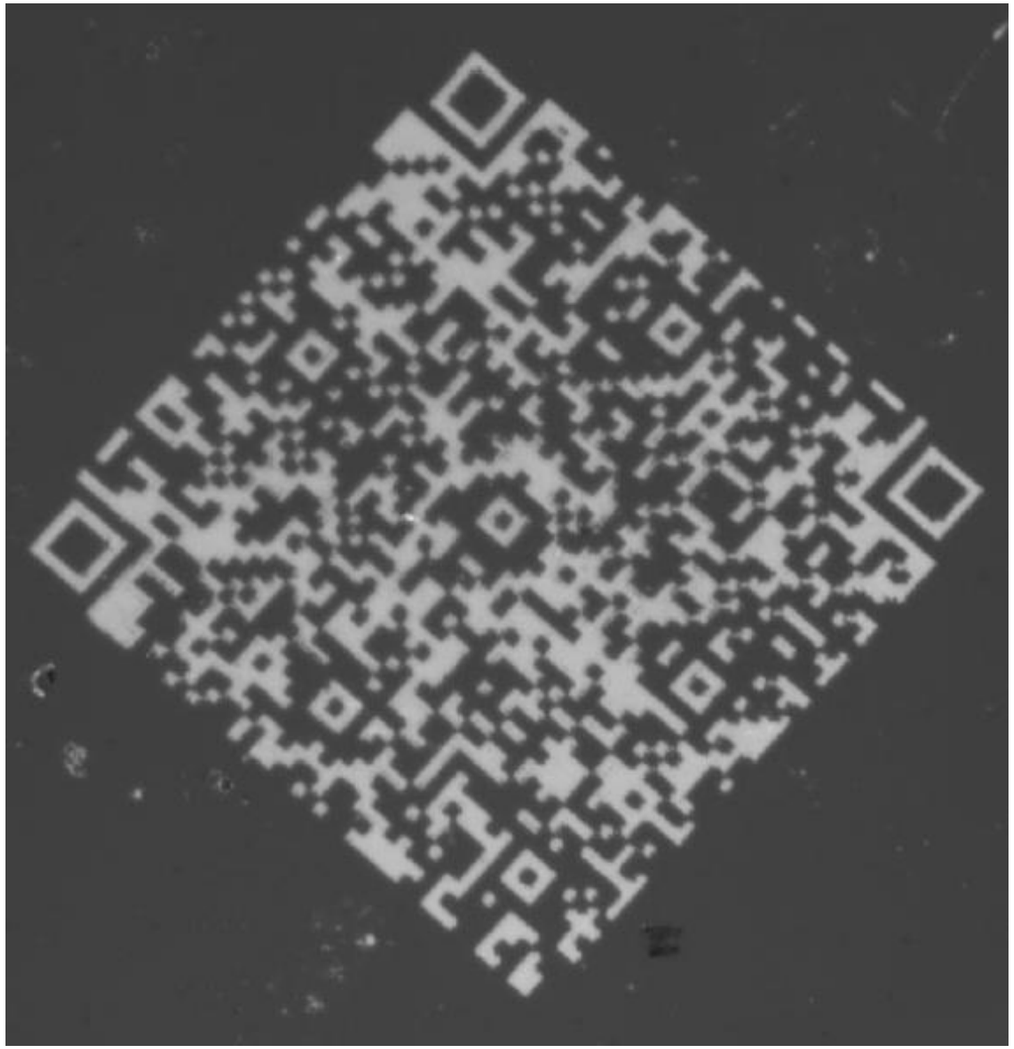
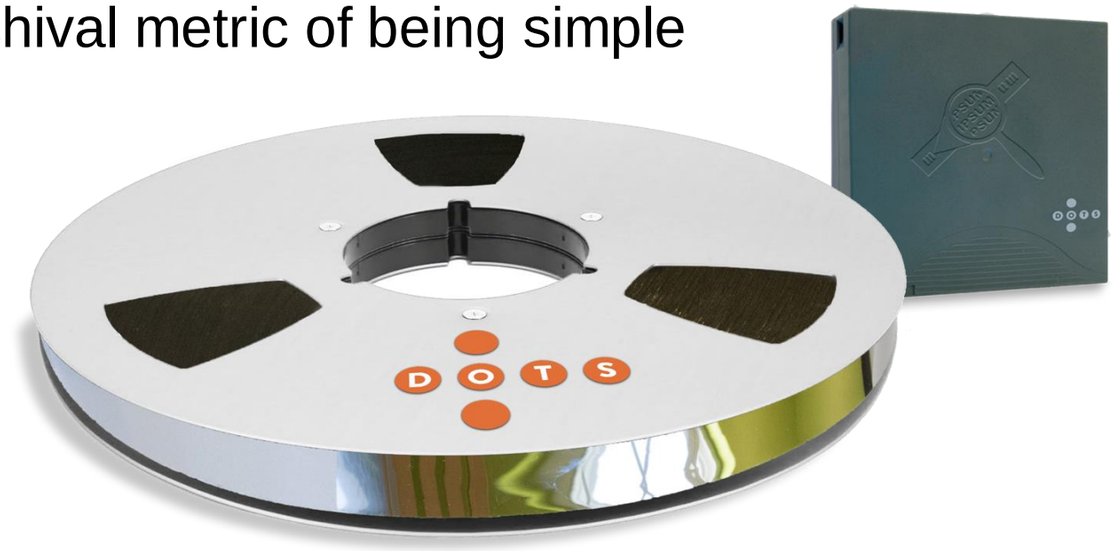
DOTS uses readily available PVD manufacturing techniques

Cerabyte Test Writes to DOTS Metal Alloy



Complex vs. Simple

- Given the choice between something complex vs. something simple for archiving
  - Why would you choose complex?
  - Increasing complexity ALWAYS leads to increasing probability of catastrophic loss
- How often has there been a catastrophic loss of thousands of books in this Library?
- When it comes to archiving, meeting the archival metric of being simple and visual comes with a trade off
  - You trade off inordinate data density for inordinate data security



Requirements to Ensure the Provenance of Digital Information

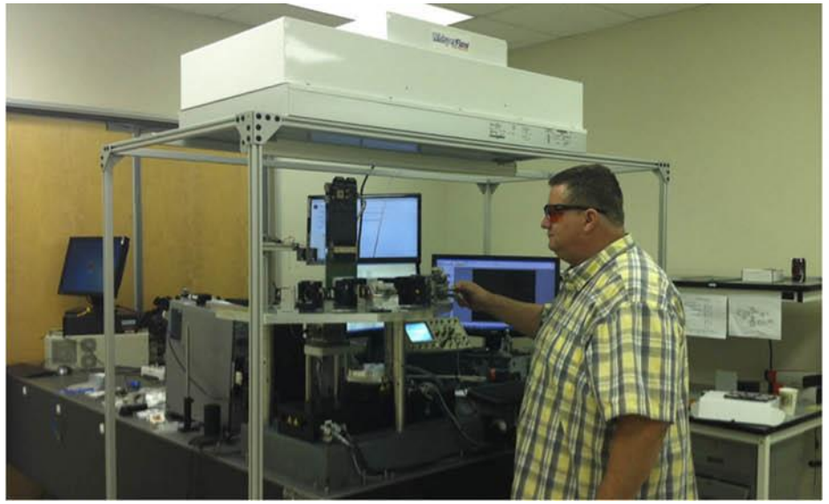
- The C2PA is doing great work to develop standards for knowing if a digital file has been tampered with
- To ensure an original file is never tampered with, ideally the data will be saved to a physically WORM media
- The mere act of migration can put provenance into question
- The data would best be saved to an inert, stable archival media that is non-magnetic, immune from magnetic fields & EMP
- Future proof storage format without operating system dependencies

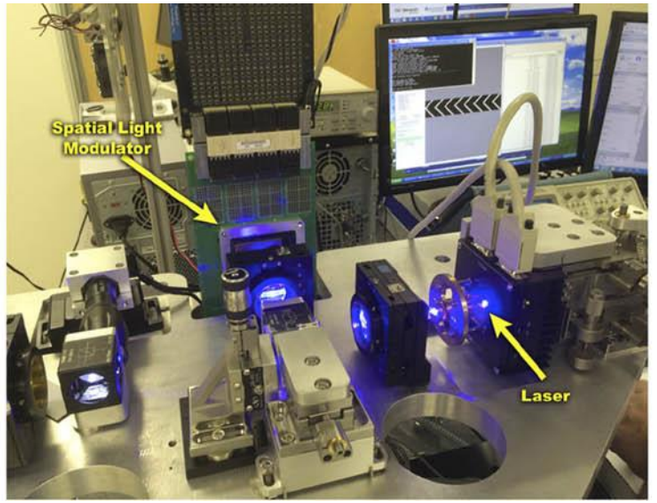
How Does DOTS Meet Those Metrics?

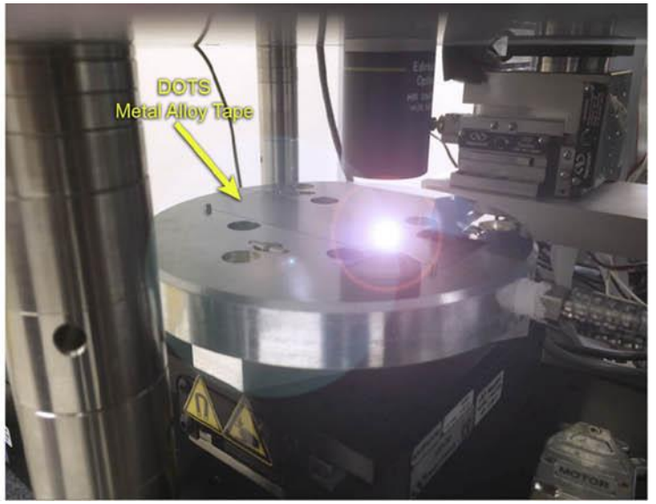
- Non-magnetic WORM Recording of any digital file
- Data is recorded *visually* - Literally an image of the data
  A dot = One, no dot = Zero
- Future proof Bit Plane Image format ensures the provenance of video, photographs, and audio for centuries
- Noncomplex - Data is retrieved with a camera
- Immune from hacking, malware & EMP
- Immune from water & petrochemicals
- Probable real world damage mechanisms

US Government Proof of Concept

- Group 47 successfully completed a contract awarded by the CIA to build a laboratory prototype proving the **DOTS** technology.
- Contract milestones included demonstration of writing and reading applications and document data in the **DOTS** visual format, and successfully writing and reading to **DOTS** metal alloy tape in the Bit Plane Image preservation format.







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To be clear….

DOTS can store ANY digital file – including images and sound

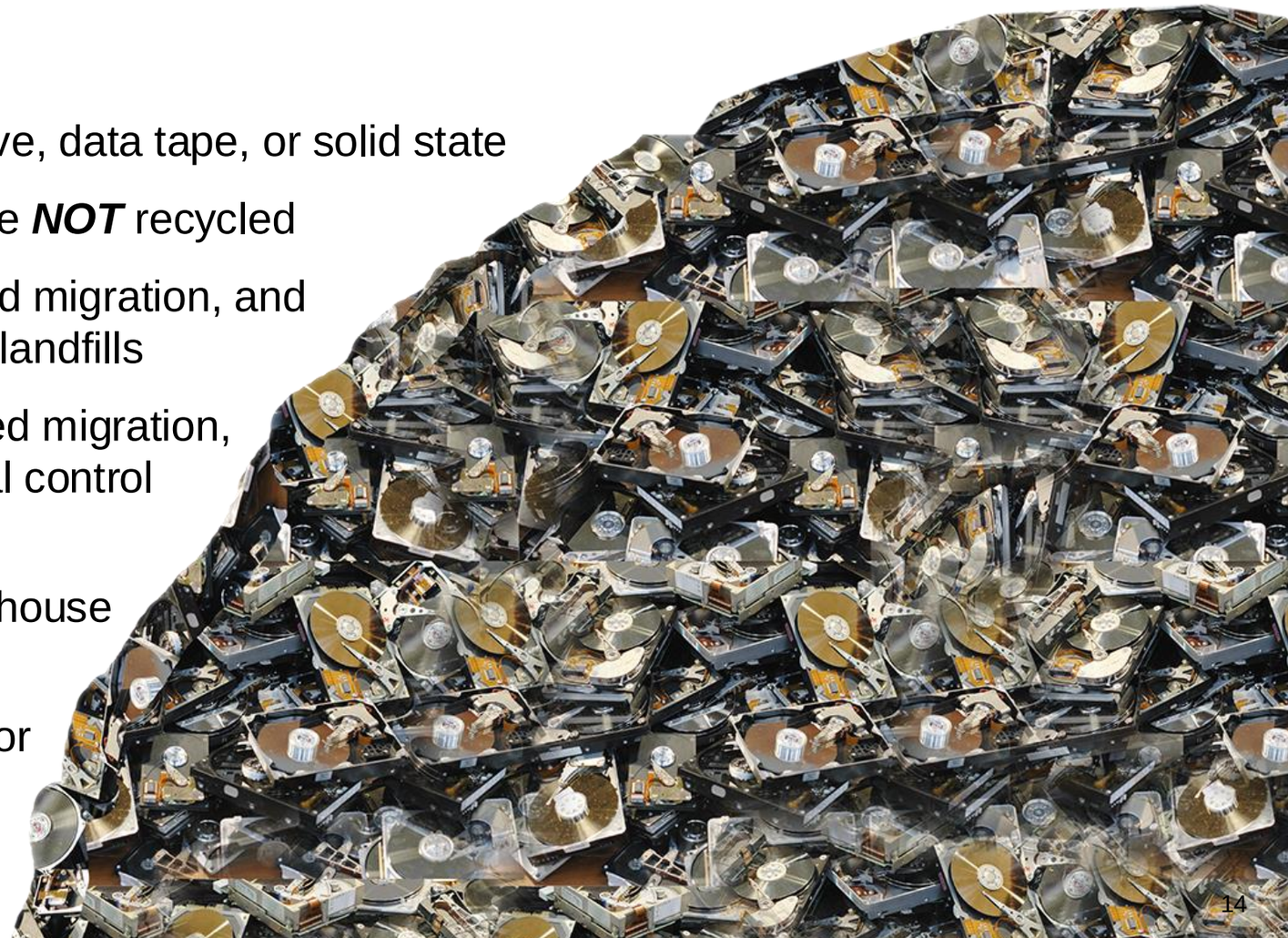
DOTS can store the same things you would save to your hard drive

However**, DOTS** ensures data provenance with simplicity of execution unlike any other alternative

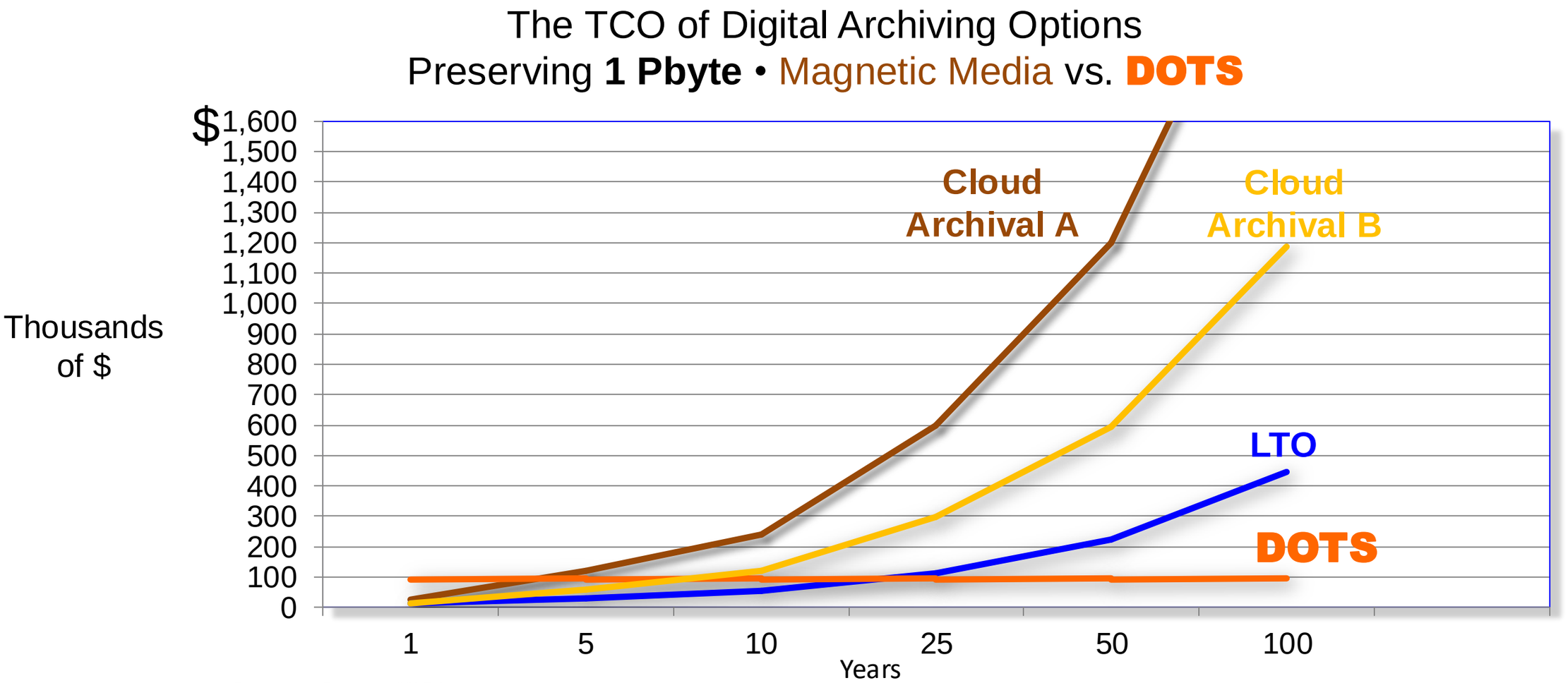
Not only does DOTS ensure Data Provenance

is Sustainable & Green

- Whether it's cloud, enterprise data center, hard drive, data tape, or solid state
- All current storage media end up in landfills and are ***NOT*** recycled
- Current practices create massive waste from forced migration, and sending countless hard drives and data tapes into landfills
- **DOTS** eliminates media & energy waste from forced migration, costly power requirements, and rigid environmental control demands
- **DOTS** can be stored on a shelf in any typical warehouse with no special climate control
- Current practices of massive power consumption for archived data are not sustainable



Total Cost of Ownership “TCO”



Parameters Based on 2025 Analysis

1) Magnetic media requires a controlled environment (temperature and humidity). Archival storage vaults for magnetic media have an average monthly cost of $3.09/cu. ft. of storage, due to the stringent environmental controls. DOTS can be stored in warehouse conditions, yet here we assume a standard office environment at $0.25/cu ft.
2) LTO cartridges are approx. .0083 cu. ft. in size.
3) Based on information from a major storage vendor, their cost to migrate one magnetic tape cartridge is $95.00 plus the cost of the media. We assume here that cost to ingest the data to LTO, and the same cost per reel of DOTS
4) For this comparison, we are assuming 1 PByte of data, a cost of $69 per LTO-8 tape and $1,800 per 20 TB reel of DOTS, and that each tape is filled to capacity. Cloud is Amazon Glacier Deep Archive; A = US West (N. CA), B = US East (N. VA), no data access.. No accounting for inflation.

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