A Timeless Principle for Preservation

"The only successful methods to preserve information throughout history have always been visual and simple."

Diane Vogt-O'Connor
Chief of Conservation (Ret.)
Library of Congress

The ‘Blank Page’ Thought Experiment

“If your organization lost its computer storage technology tomorrow, would your organization’s legacy be a blank page? Or could a mechanically inclined person with a light and a lens still retrieve your truth?”

The Complexity Paradox

The Archivist's Metric

Increasing complexity always leads to an increasing probability of catastrophic failure.

HIGH COMPLEXITY (CURRENT STANDARD)	PROVEN SUCCESS (HISTORICAL)
• Magnetic & Cloud Storage	• Visual & Simple
• Requires OS dependencies	• Paper, Vellum, Film
• Proprietary software	
• Constant energy	

To read unknown digital data on an obsolete storage device:

- 1. Determine how digital data is physically stored on the media(e.g. magnetic particles, chemical arrangements, etc.). Sophisticated, potentially expensive forensic equipment needed to determine physical storage technique. Lots of brain power needed.

- 2. Determine the structure of the physical data on the media (e.g. multiple tracks, multiple optical layers, etc). Sophisticated, likely very expensive equipment needed due to the highly likely need for things such as electron microscopy, etc. Lots of brain power needed.

- 3. Create a physical device capable of properly reading the physically stored digital data and moving it to a storage medium which is currently understood.

  Likely a long term, expensive project unless old devices exist and can be refurbished and made to work with up to date technologies. Lots of brain power needed.

To read unknown digital data on an obsolete storage device:

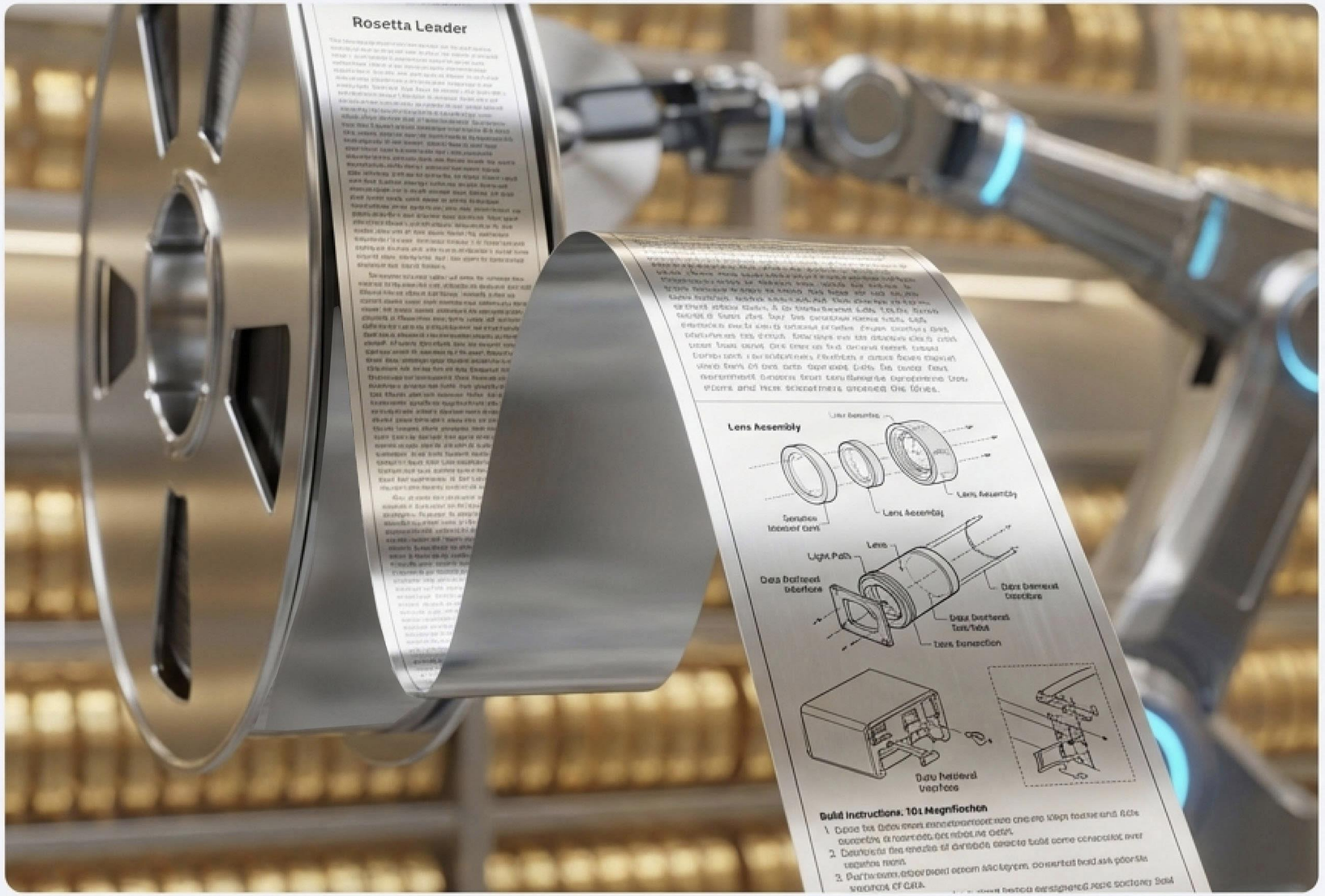
- 4. Examine the stored data and determine the data encoding scheme (e.g. ASCII, EBCDIC, IEEE floating point, etc.). No new equipment needed.
  Lots of brain power needed.
- 5. Determine the file format of the data. No new equipment needed.
  Lots of brain power needed.
- 6. Create software or hardware to read the file format of the data & store it. New s/w and sometimes hardware needed. Lots of brain power needed.
- 7. Translate data to usable information. No equipment needed.
  Little brain power needed.
- 8. Done

To read unknown humanly visible written or physically inscribed data on a medium:

- 1. Ingest data via human visual system. No equipment needed
- 2. Determine data representation (e.g. logographic, syllabary, segmental, or alphabetic). No equipment needed.
  Lots of brain power needed.
- 3. Translate data to usable information. No equipment needed.
  Lots of brain power needed.
- 4. Done

Future-Proofing Knowledge

No Operating System Required



Self-Describing Media: The leader contains instructions, encoding schemes, and source code visible to the naked eye.

Backward Compatibility: Guaranteed for centuries. A Generation 10 reader can read Generation 1 tape because it's just imaging.

The Mic Drop: Even if civilization loses all computer technology, a mechanically inclined person could build a device to retrieve this data.

DOTS: The Simplicity of Film, Re-Engineered for the Digital Age.

35mm Film Reel

Actual **DOTS** Media Reel

Similar to Film (The Proven Archival Media)

- **DOTS** is simple to interpret
- Reading is non-complex: required only light and a lens.
- A human can interpret the information (with magnification).
- Extremely robust and long lived (Carnegie Mellon testing concludes 200-2,000 year viability).

Improves Upon Film's Downsides

- Density: One 12" reel of 35mm wide **DOTS** stores 37 TB. It takes 120 reels of film (a 12-foot stack) to store just 8 TB.
- Storage: **DOTS** is stable from -9º to 66º C at any humidity. Film requires stringent environmental controls.
- Availability: **DOTS** uses readily available PVD manufacturing techniques, avoiding the risk of photosensitive film emulsion becoming unavailable.

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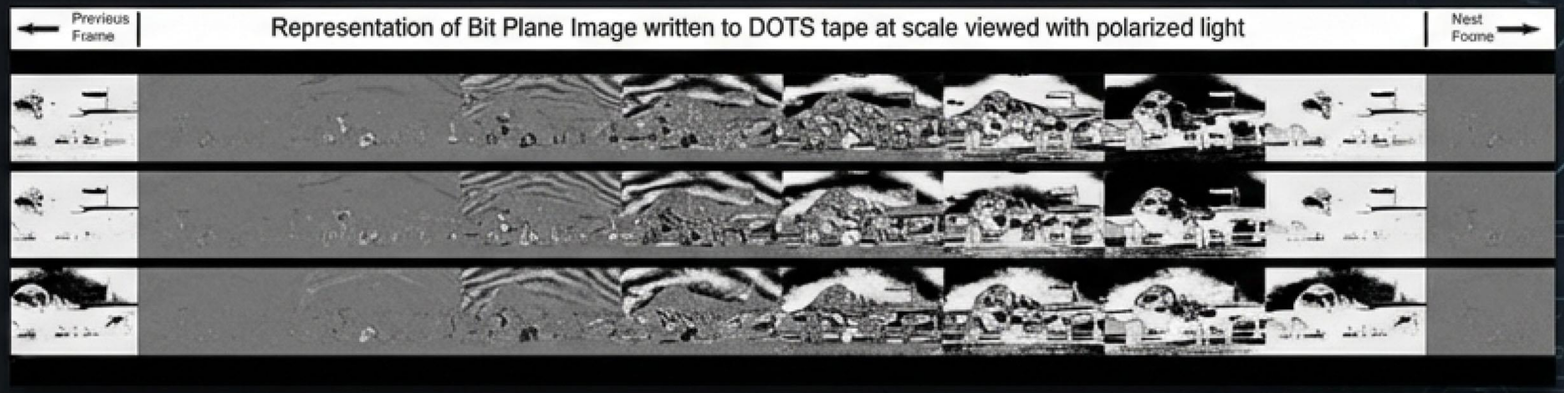
Future-Proofing Beyond File Formats

No OS Required. Just Light and a Lens.



The patented Bit Plane Image format stores images and sound as a visual stream, not a file format dependent on specific software. Guaranteed backward compatibility for centuries.

Validated. Tested. Proven.

Kodak

Spent $218 Million (in today's dollars) in original R&D.

CIA

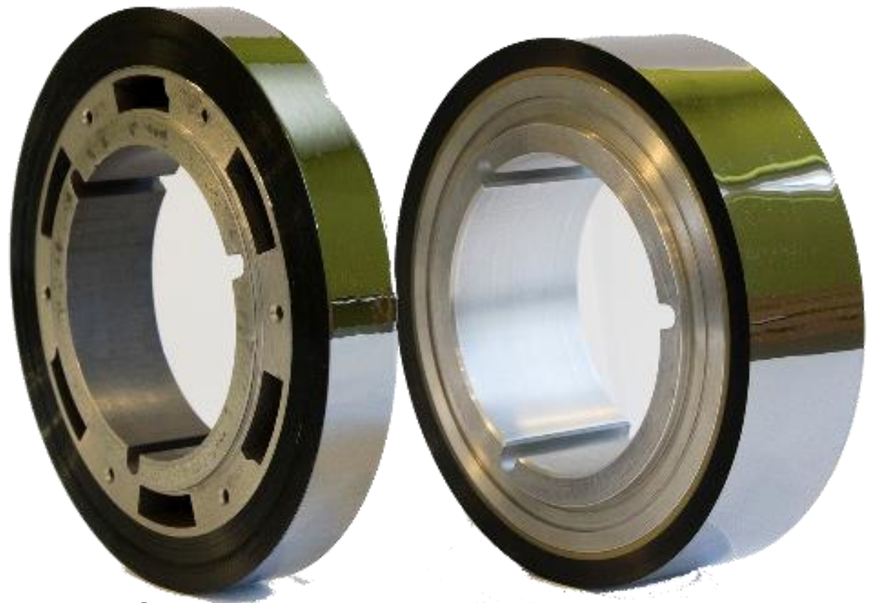
Contract completed to build prototype and prove technology.

Carnegie Mellon University

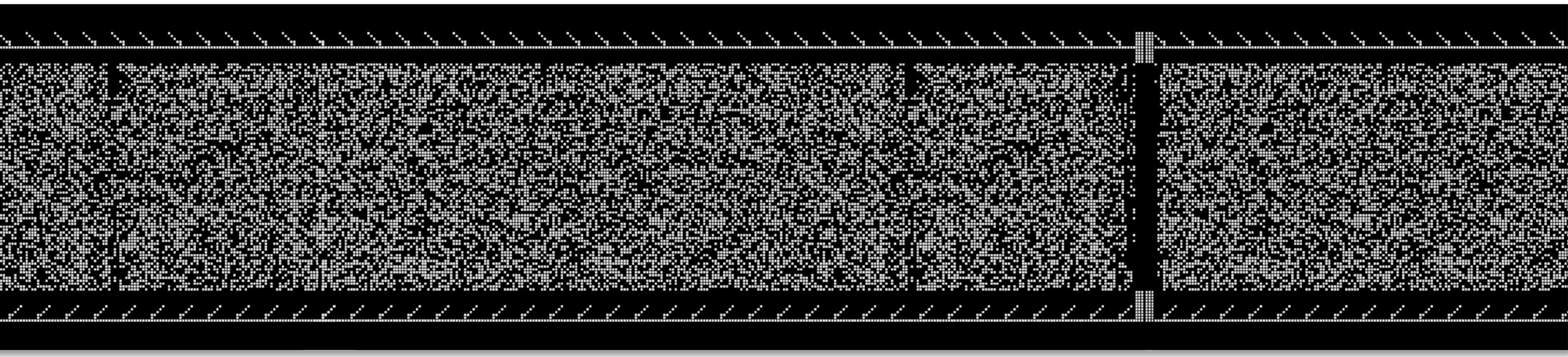
Accelerated life testing confirmed viability for 200 to 2,000 years.

This is not theoretical. The technology is finished.

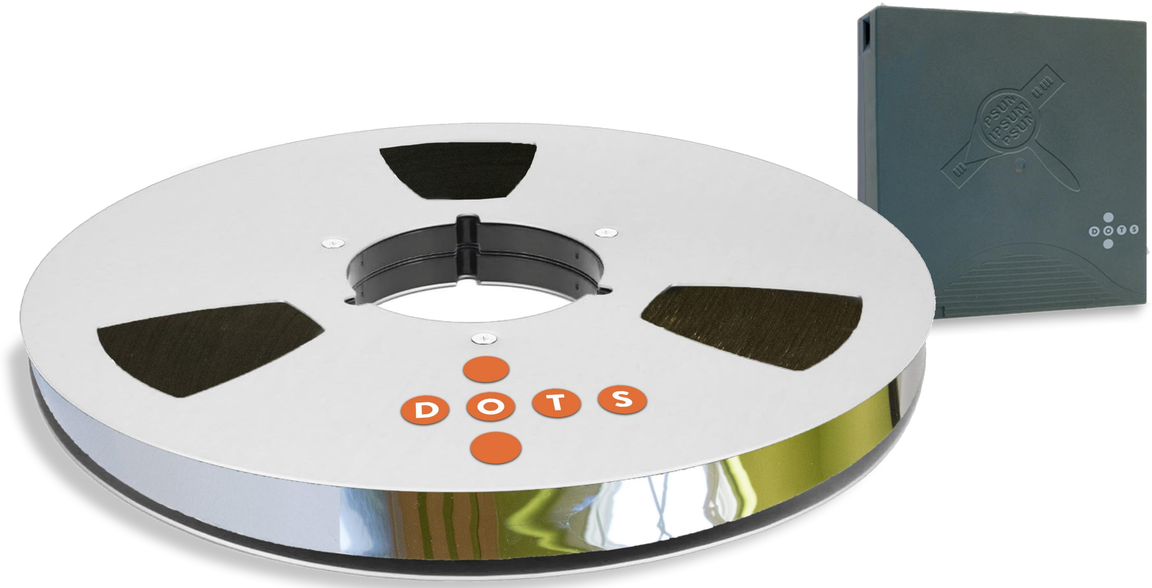
DOTS What is it?



- **DOTS,** Digital Optical Technology System, is a method of representing data visually on a metal alloy
- Data is written with a laser at 1 GByte/second
- Data is read with a camera at equal or faster speeds.
- When read under polarized light, the metal alloy becomes dark with the written data contrasting sharply with the background



DOTS What is it?



- **DOTS** is a phase change media composed of a patented metallic alloy sputtered on an archival polyester base (e.g.: Aramid, Mylar™, Estar™)
- Group 47’s new design was proven in a contract with the CIA
- Components for **DOTS** recorder/readers employ off-the-shelf imaging and laser technologies
- Standard manufacturing techniques are used to create **DOTS** tape
- Which means…

DOTS uses the same techniques to create the metal alloy tape as is used to preserve food.

DOTS™

Data as Durable as History

DOTS can ensure the 21st Century isn’t a blank page.