Nanofiche™ Permanent Analog Archival Technology

NanoArchival Solutions
www.nanoarchival.com

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PRESENTED BY

NOVA SPIVACK AND BRUCE HA

Existing Storage Solutions Are Not Permanent

- Energy-dependent
  - (servers + drives + HVAC) * 100's of years
- Ongoing maintenance costs
  - Labor, training, warranties, software support, storage media, physical real-estate, data migration, quality and fixity testing
- Highly vulnerable
  - Risks from fire, flooding, humidity, dirt
  - Risks unique to electronic systems
    - Continuous obsolescence of hardware, software and storage media
    - Power and network outages
    - EMP risks
    - Hackers

How to Achieve Permanence (And Reduce Costs!)

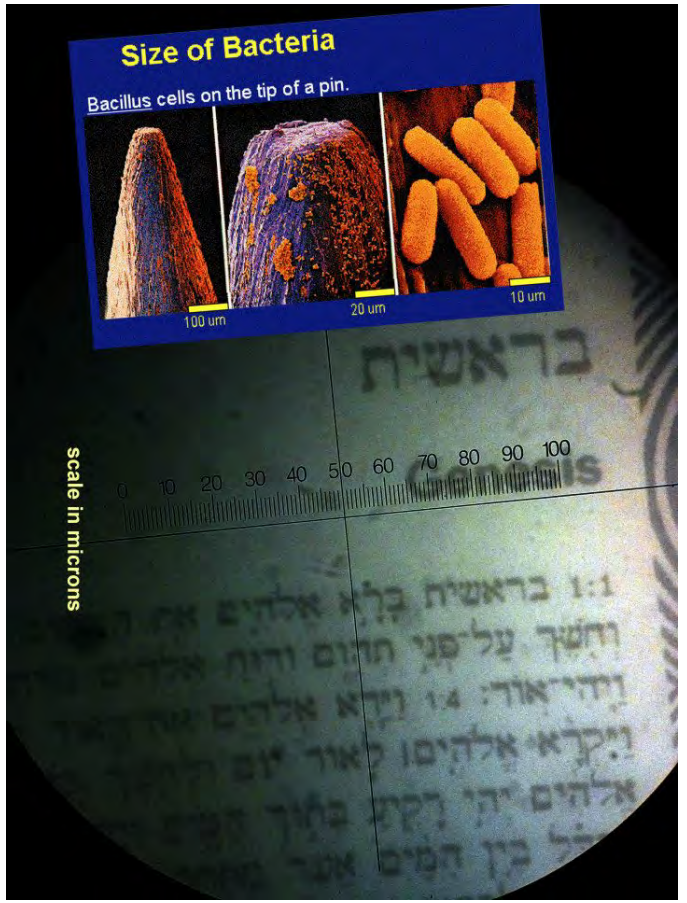
- Continue to use existing digital storage solutions, and….
- Add a permanent archival preservation layer
  - For mission-critical archival data and content with historical value
  - Add a permanent analog cold storage solution
  - Eliminates the need for constant migration
  - Reduces maintenance costs and lowers TCO over time
  - Integrates seamlessly with digital storage systems
  - If everything else fails, this is a guaranteed last-resort

Introducing Nanofiche™

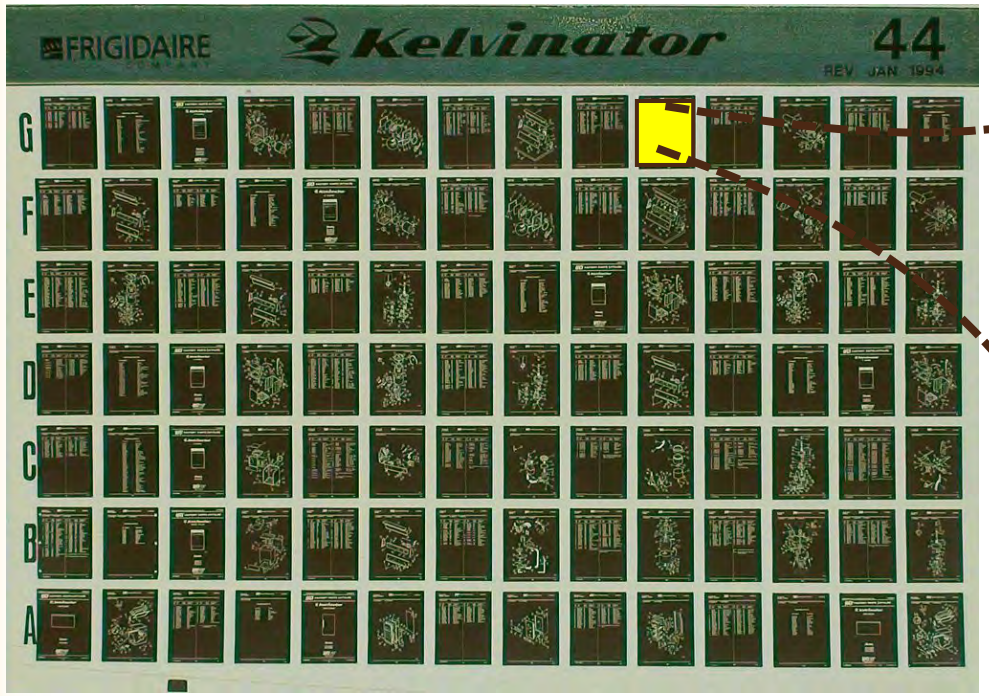
Nanofiche™ is a Permanent Archival Solution

- **High density analog human-readable archival preservation medium**
  - Extremely compact physical storage
  - Made using high-speed lithographic process (1000 ppm)
  - Scalable low-cost mass production and replication
  - Resolution from max 300,000 DPI (80 nm feature size) to 100,000 DPI (240 nm feature size; readable with a 400x optical microscope)
- **Highly Durable**
  - Readable for more than 10,000 years
  - No more migration; permanent preservation of master copy
  - Impervious to temp/humidity variations (no HVAC required)
- **Easy to Access**
  - Simple reader (worst case: all you need is a lens + light; best-case: digital)
  - Human-readable; no electronics, or power requirements in worst-case scenario
  - On-demand automated conversion from analog to digital documents

Nano-scale lithographic etching



Nanofiche is 4800 times more space efficient vs. microfiche



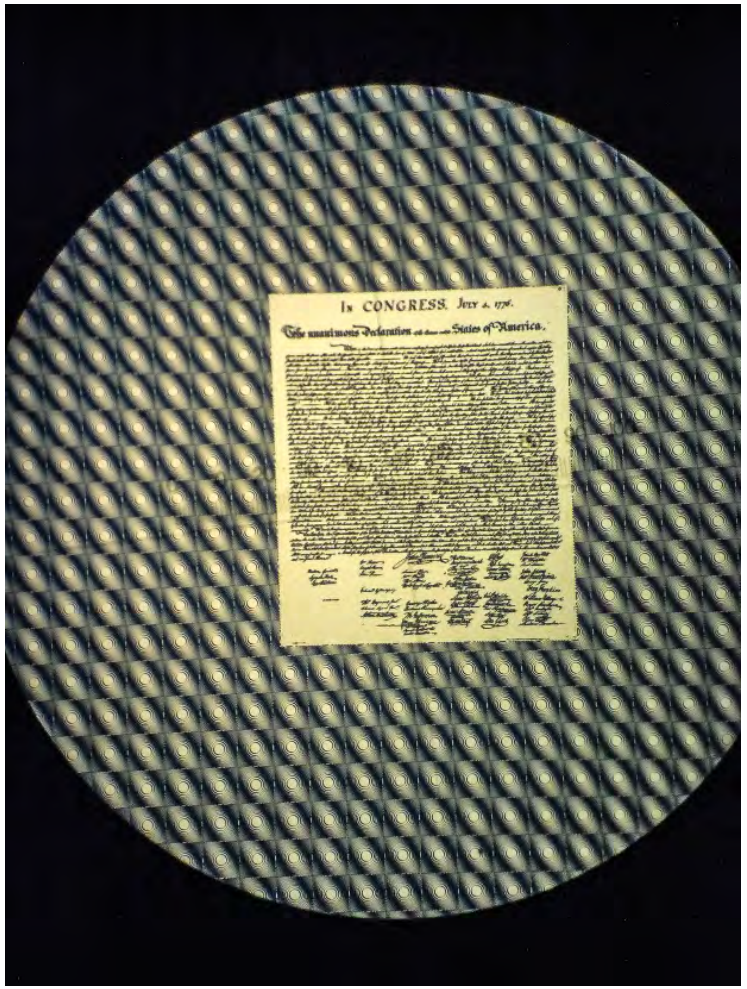
1,680 nanofiche document pages fit in 1 document page of a microfiche card

3" x 5" microfiche card = 96 document pages

3" x 5" nanofiche card = 161,200 document pages

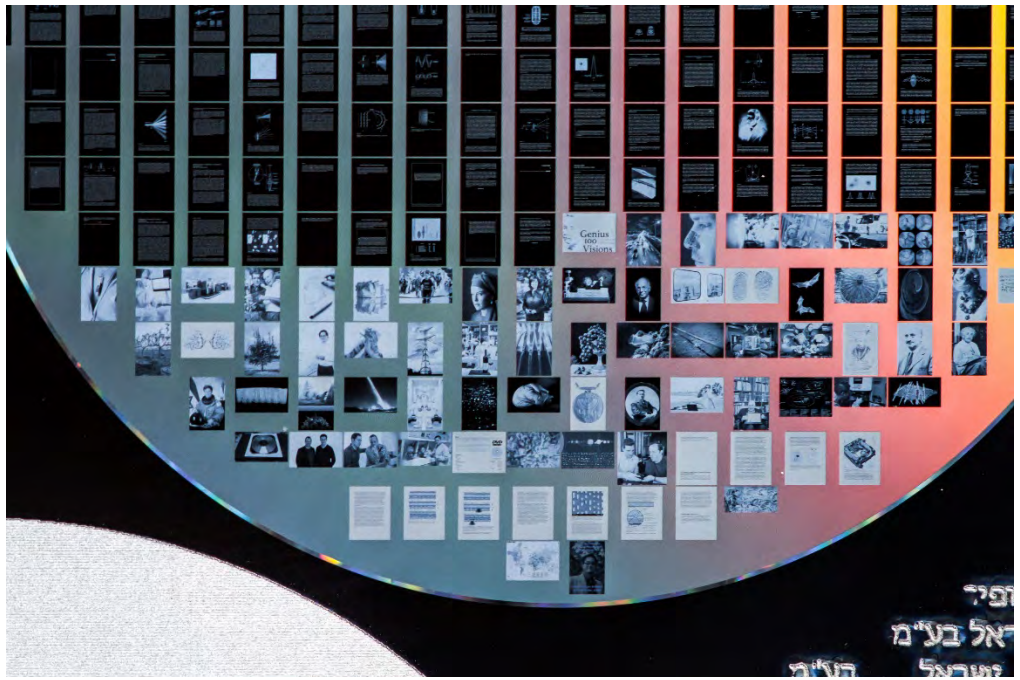
Examples

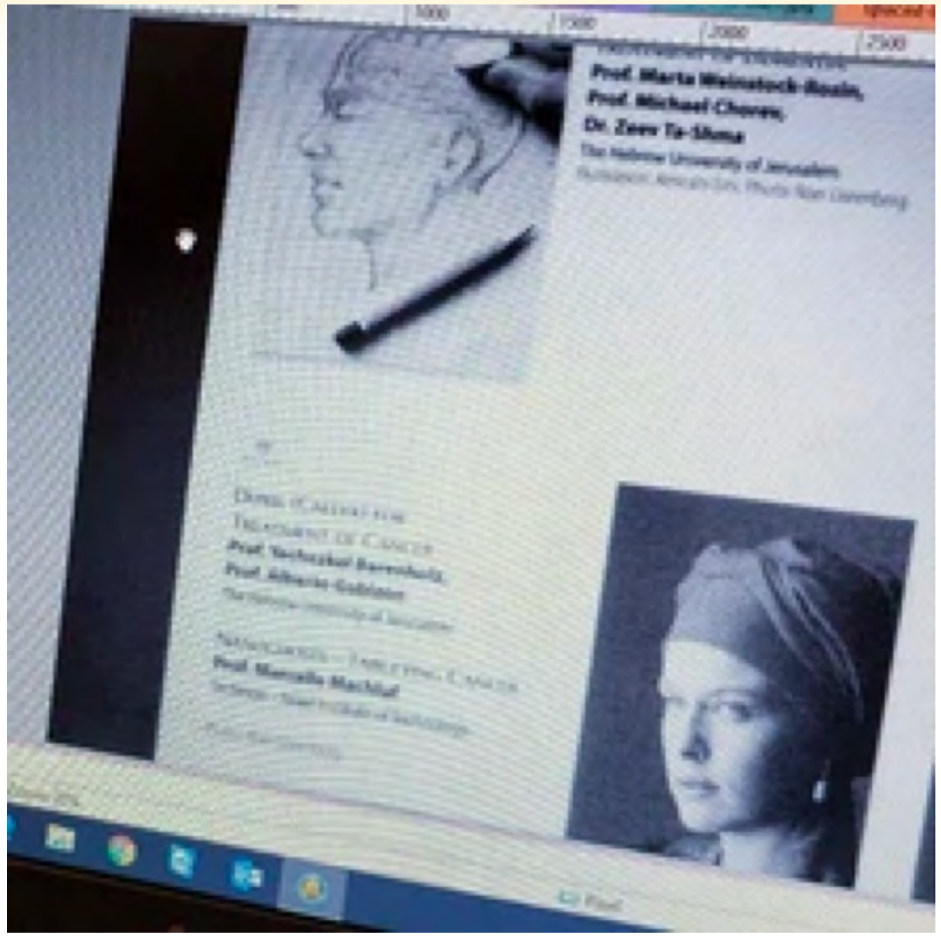
Entire Bible can fit in 18mm circular area
(1.3 million characters)



Declaration of Independence
One millimeter tall

Grayscale and Color





- Grayscale is achieved by dithering
- Color is achieved by CYMK color separation and recombined digitally

Digital Content Access

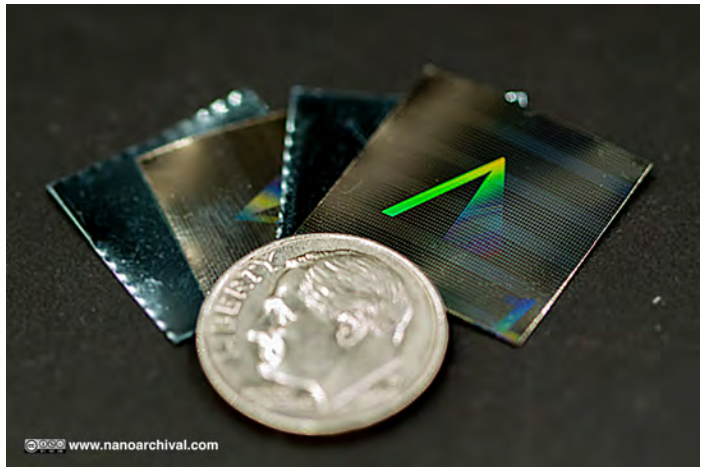
https://vimeo.com/358339767

- Digital access to storage media on enterprise systems or mobile devices
  - Via QR code
  - RFID/NFC chip
  - Via on-demand robotic retrieval systems
- Embedded Security Features
  - Verification of authenticity
  - Proof of possession
  - Anti-counterfeiting
  - Watermarking
  - Track and trace

Embedded Metadata for Search and Retrieval

- Grid based coordinate system
- Fiducial marking for auto alignment
- Readable TOC without aid serves as a lookup table for nano content
- Pages tagged with a title, page number, and nanofiche coordinate from each document
- Nanofiches are tagged with serialized number and QR code for identification and virtual viewing

Automated Analog to Digital Retrieval & Access Control



- Automation
  - System is accessible locally or controlled remotely with robotic handling system
  - Enter the document ID or scan QR code of the document and enter the pages needed to be recovered.
  - System retrieves the scan, OCRs it and creates searchable PDF output
    - Demo: https://vimeo.com/358332891

- Security
  - Content can be encrypted and secured. A key would be required to unlock.
  - Biometric access controls
  - System can locate and track every card using RFID

What Does It Take To Store 1 Billion Document Pages on Nanofiche?

Space

- 1 billion pages = 1,600 nanofiche cards
  - 60,000 pages per nanofiche card
- 1,600 cards fits in 56 feet of shelf space (4 bookshelves)
  - Nanofiche card dimensions: 5” x 5” x 300 microns

Time

- 1 billion pages can be printed in 1 year, on 2 printers
  - 1,000 pages per minute, per printer
  - 525,600,000 pages per year, per printer

Background

Patents and Technology
(stampertech.com)

Business Development
(archmission.org)

nanoArchival™

Operating Company
(nanoarchival.com)

Key People

- **Nova Spivack**
  - Co-Founder and Chairman of Arch Mission
  - 25 years of building new ventures with billions of wealth creation
  - Flew to edge of space
  - Top 20 Futurist and Top LA Power Player in Technology
- **Bruce Ha**
  - Founder and CEO of Stamper Technology
  - 31 years experience in aerospace and optical storage
  - Inventor of Kodak Picture CD mass customization technology
  - Inventor of NanoFiche™ technology

Contacts

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