



STORAGE DEVELOPER CONFERENCE

SNIA ■ SANTA CLARA, 2016

# Data Retention and Preservation The IT Budget Killer is Tamed

Shawn Brume  
The LTO Program

# What is the LTO Program?

Technology Provider Companies



Quantum

## Write LTO technology specifications

Specifications are an open standard

- License to any organization
- Multiple Licensees
- 5 Media manufacturers  
(Fuji Film, Imation, Maxell, Sony, TDK)

## Publish the LTO Roadmap

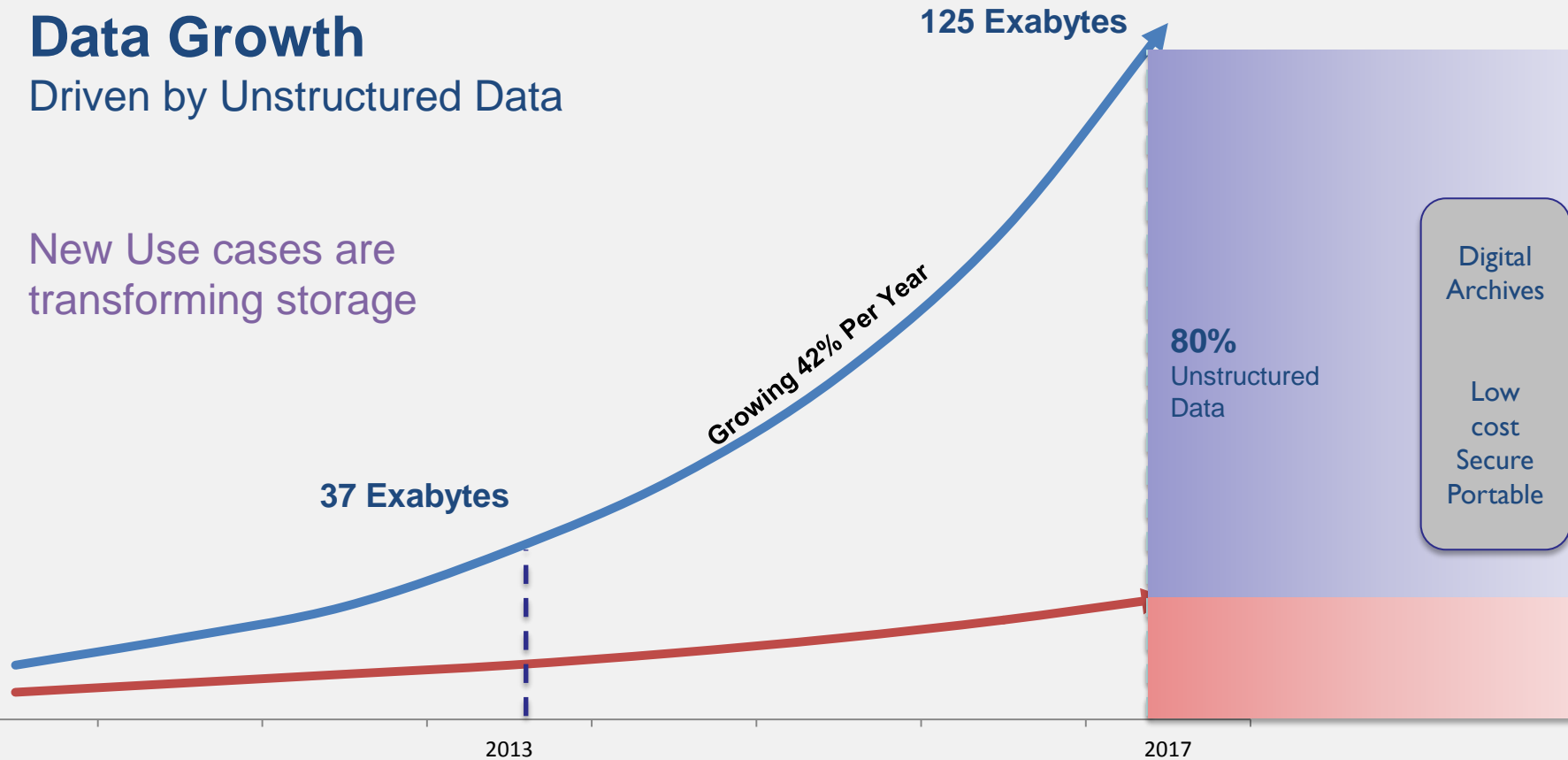
- 10 Generations
- Capacity targets of up to 120TB  
**per cartridge**

# What is the challenge for IT professionals?

## Data Growth

Driven by Unstructured Data

New Use cases are transforming storage



# Cold Data Dominates Storage

- ❑ 80% of data is untouched
- ❑ Prevent data sprawl
- ❑ Improve Margins with storage
- ❑ Fund I/O intensive workloads
  - ❑ LTO7 technology for long term retention

Worldwide Capacity-Optimized, Performance-Optimized, and I/O-Intensive Storage Systems Shipments, 2012-2016

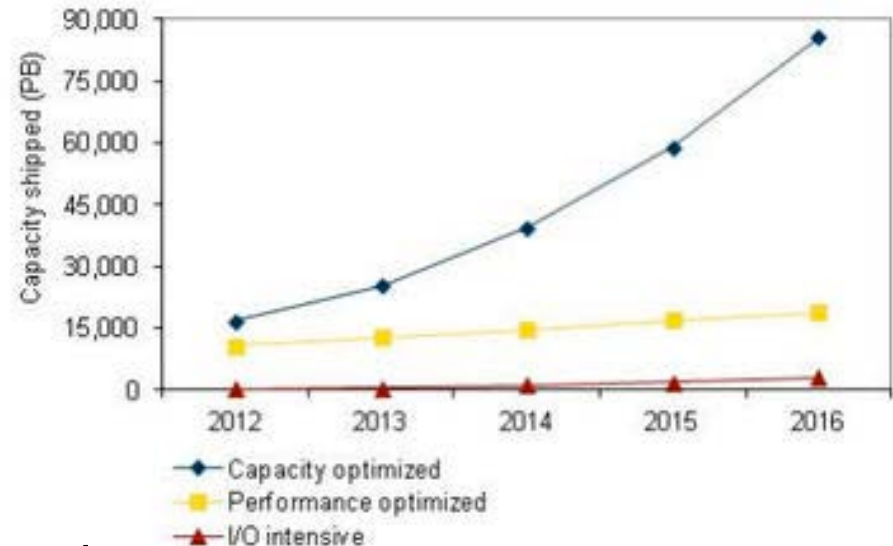


Image Source: IDC 2013 from <http://www.zdnet.com/article/storage-in-2014-an-overview/>

# Tape in the Cloud

“Where do you think Zettabytes of data will be stored?” ...you probably have to store it on tape.”  
Aaron Ogus (Development Manager for Windows Azure Storage)



Data  
Unaccessed  
for 180 days



LTFS Based  
LTO Tape

Improve  
ROIC

- Lowest cost storage<sup>1</sup>
- Reduced Hardware replacement

Reduced  
Carbon  
Footprint

- Reduce power consumption by up to 105%<sup>2</sup>
- Less media disposal

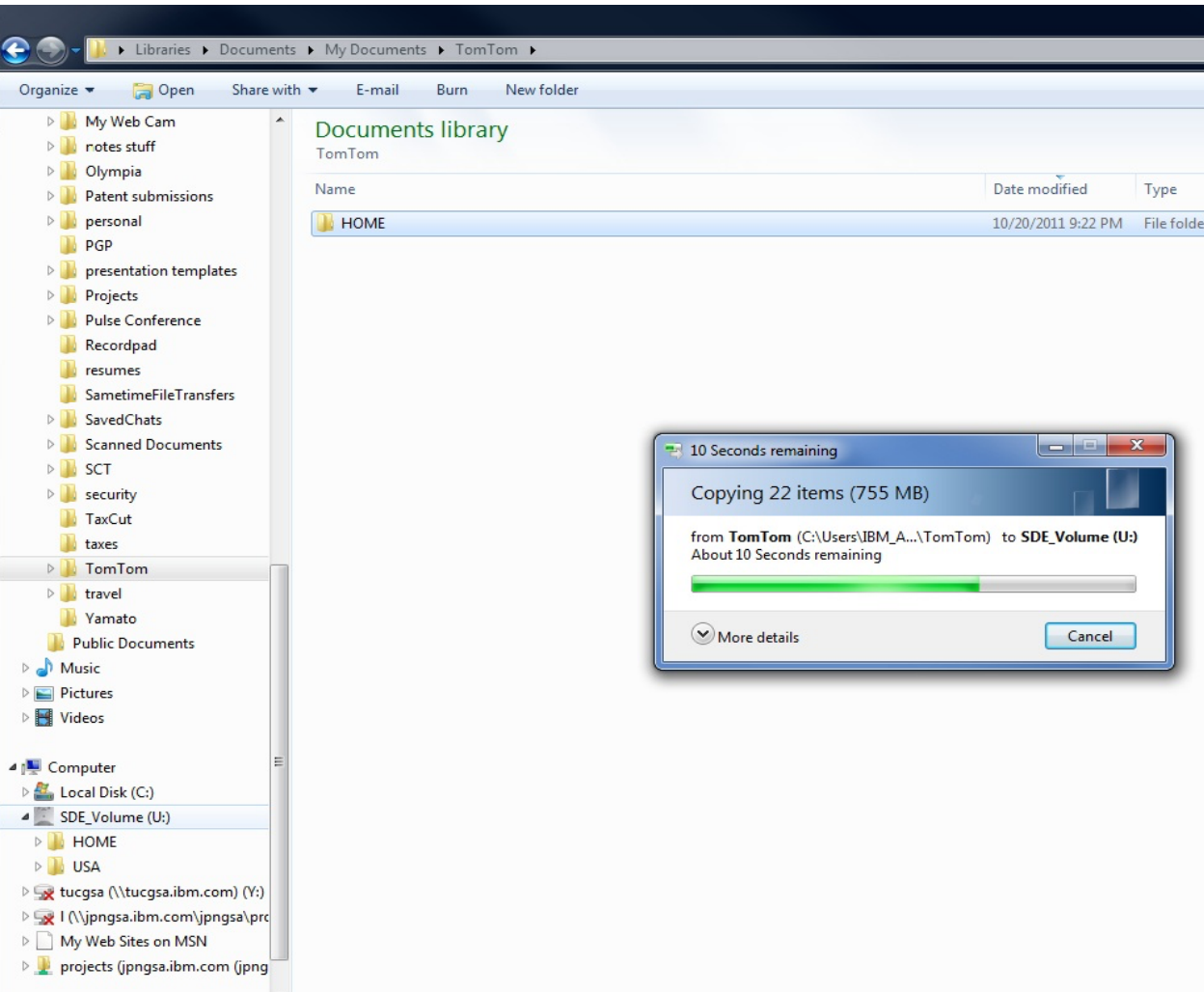
Reduced  
Management

- Retain data on same media for 10 years reducing migrations
- Less resource spent replacing and rebuilding data storage

<sup>1</sup> LTO.org LTO6 cost of storage announcement

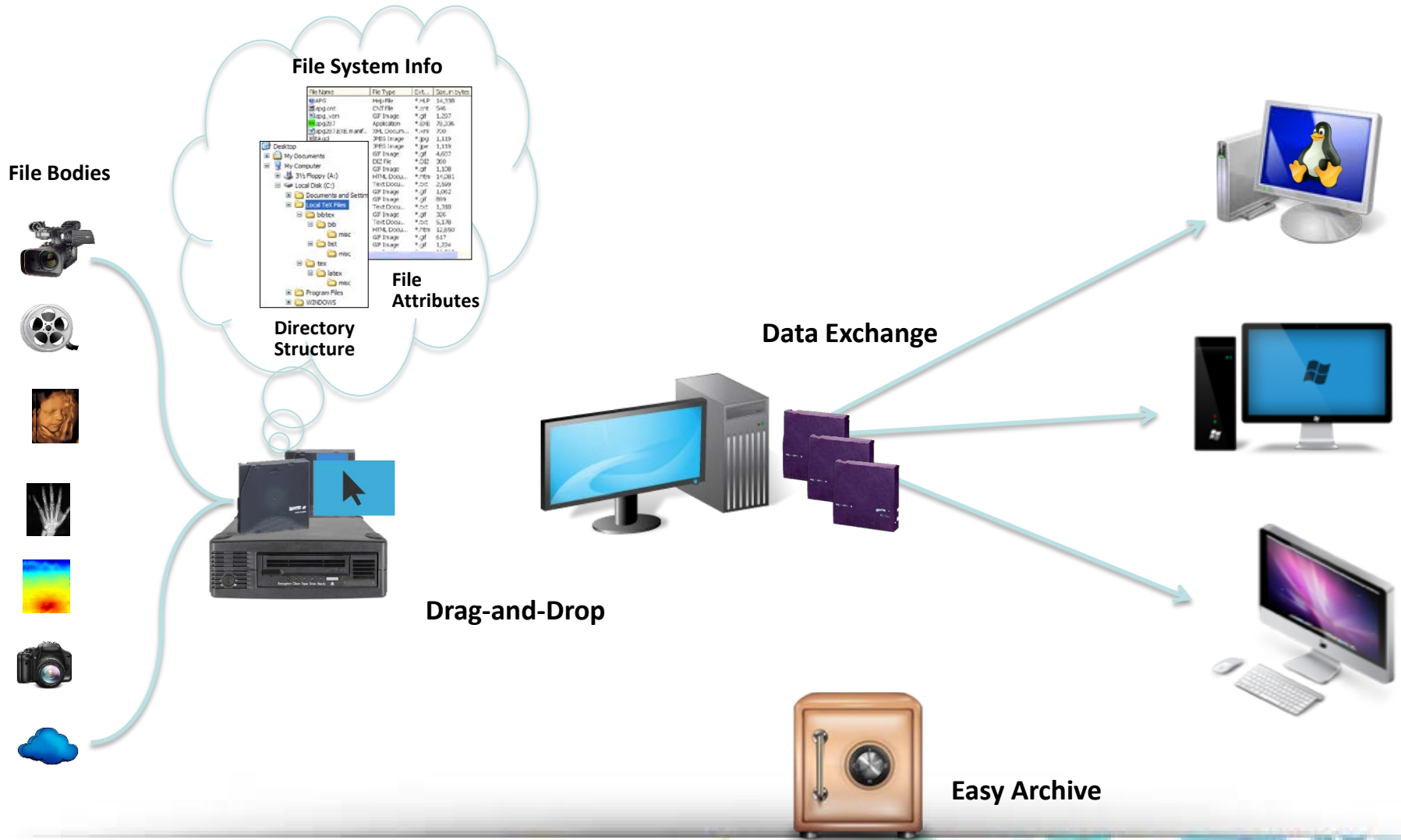
<sup>2</sup> Clipper Group Long Term Retention TCO

# LTFS: The easy button for tape storage



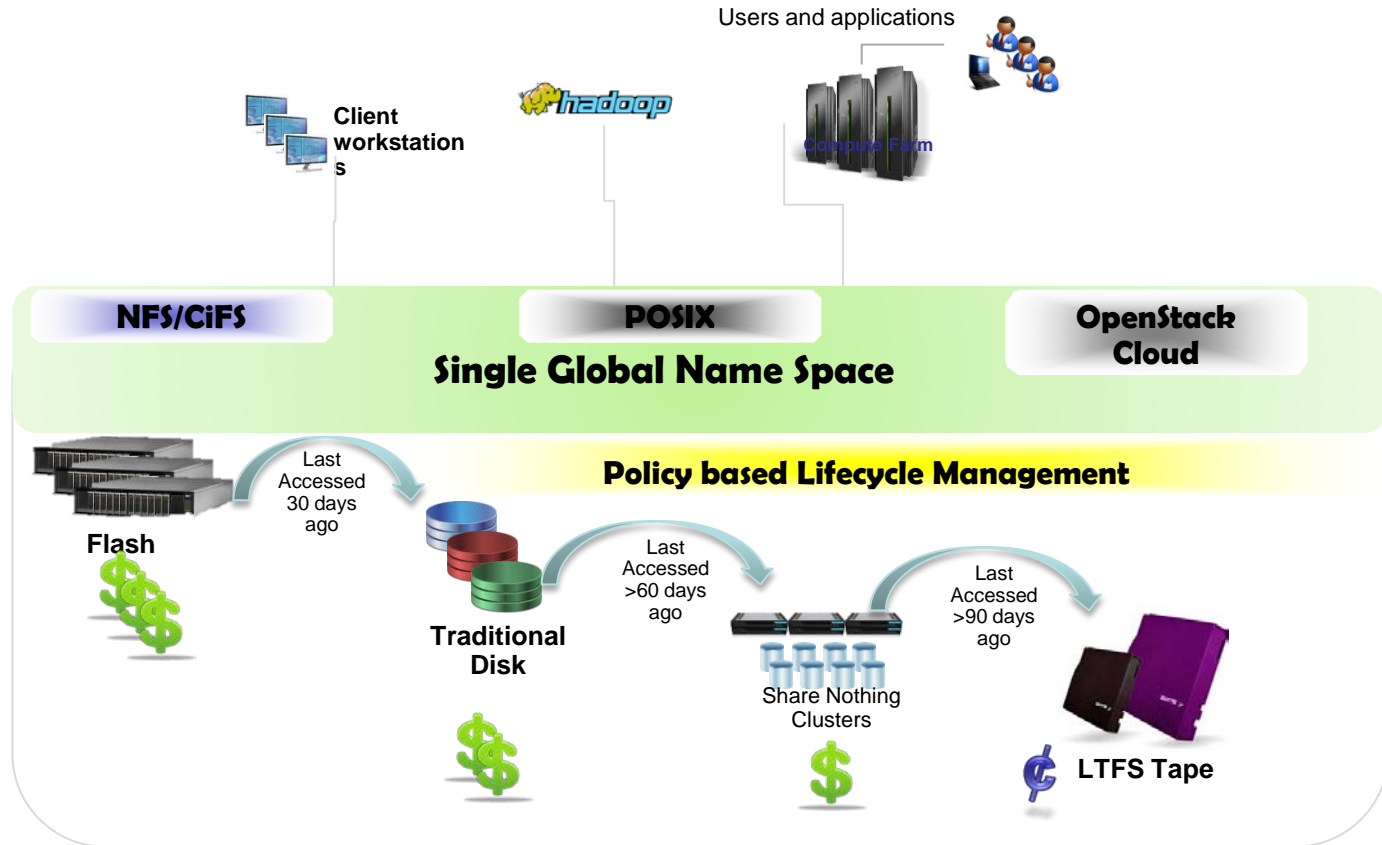
- Tape drive appears as a drive letter
- Move data without an ISV
- Browse tapes like disk

# LTFS has changed the world we live in



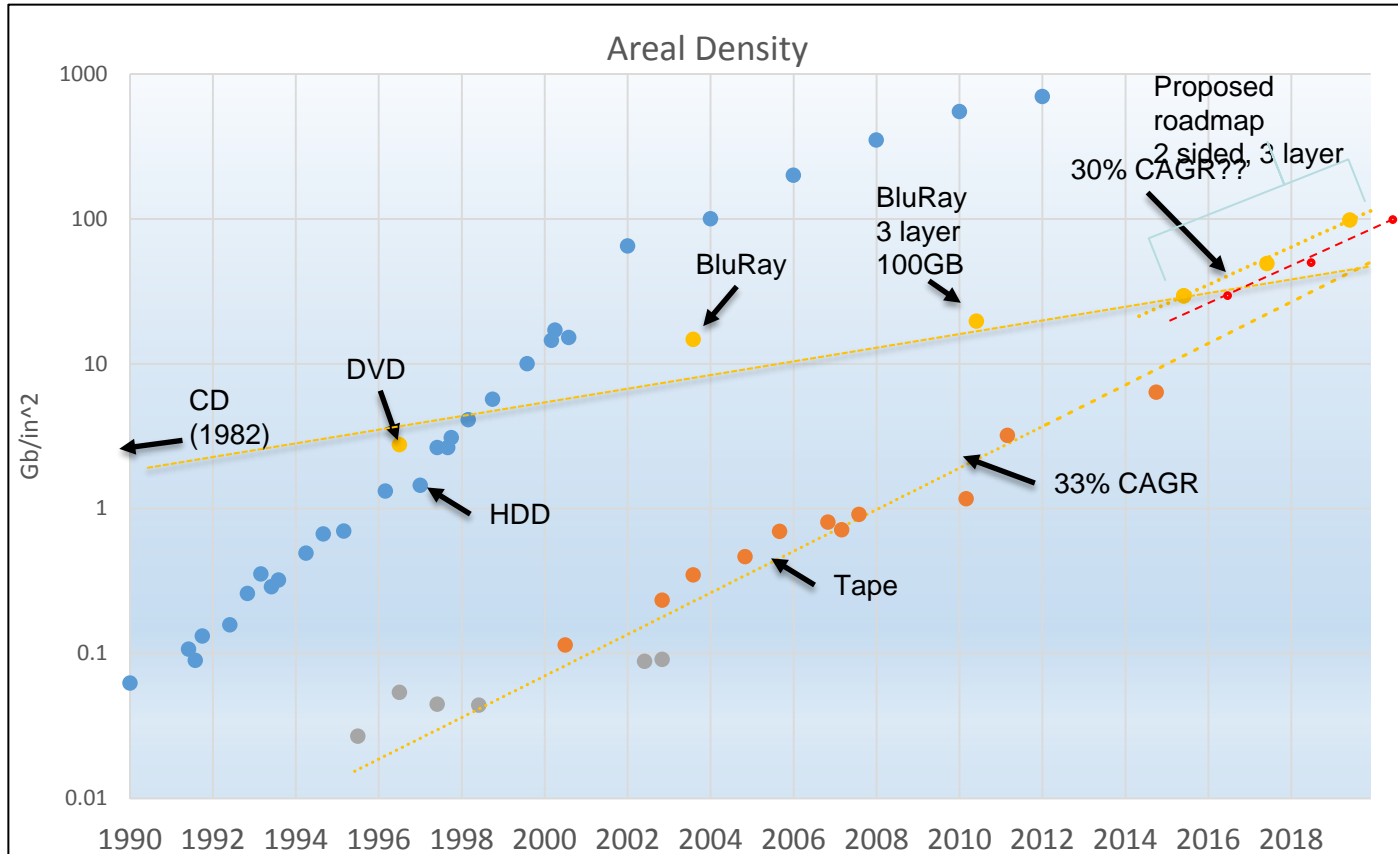
# Information Lifecycle Management

- Quickly deliver the cost and performance advantages of tape
- Help control the cost of storage by moving cold data from tiers that rely on higher-cost disk drives to tiers that incorporate lower-cost tape media
- Provide the scalability, manageability, and performance in a single managed solution

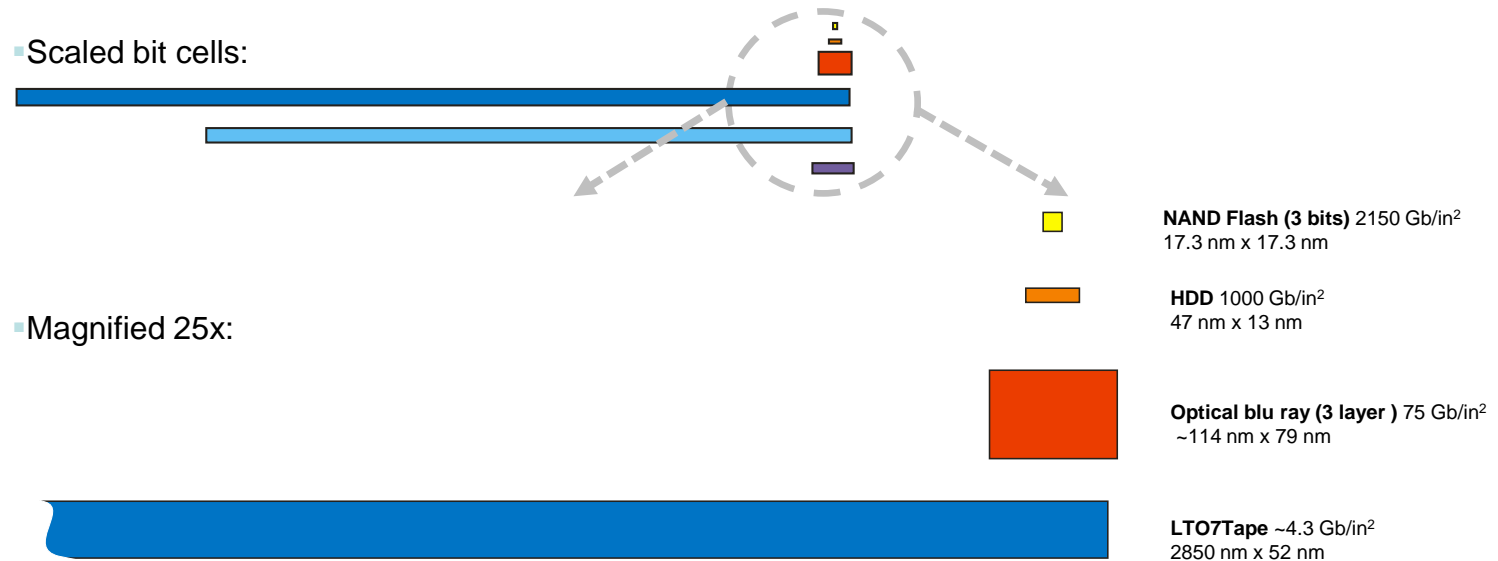




# Areal Density Trends



# 2015 Storage Bit Cells and Extensibility



Tape is not challenged even at the densest technology Demonstration

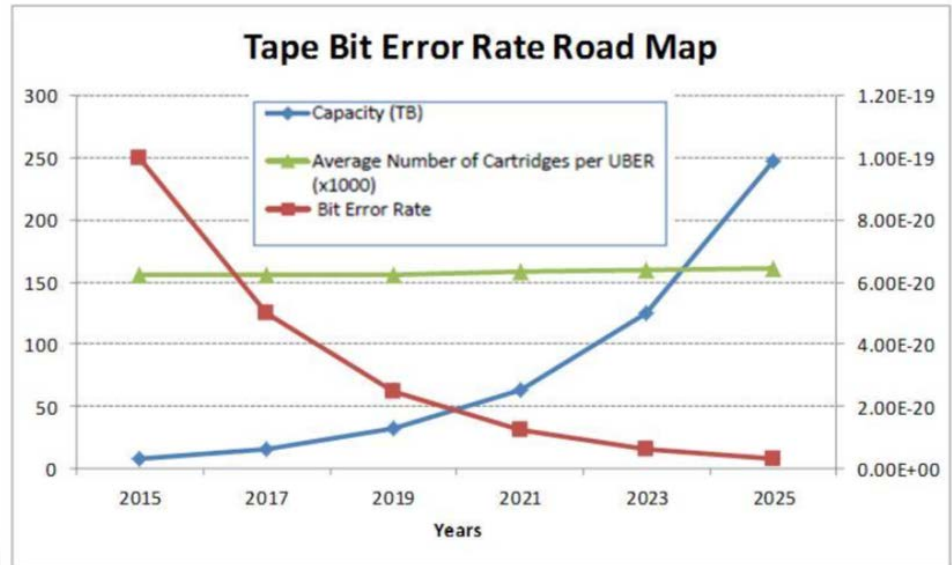
→ Tremendous potential for future scaling of tape track density

→ Key technologies: improved track follow servo control improved media, reader, data channel

# Tape Reliability is Unsurpassed

Device	Hard Error Rates in bits	Equivalent in Bytes	PB Equivalent
SATA Consumer	10E14	1.25E+13	0.01
SATA Enterprise	10E15	1.25E+14	0.11
SAS/FC Enterprise	10E16	1.25E+15	1.11
Enterprise SAS SSD	10E17	1.25E+16	11.1
LTO7	10E19	1.25E+18	1110
Enterprise tape	10E20	1.25E+19	1120

Bit Error Rate will continue to improve

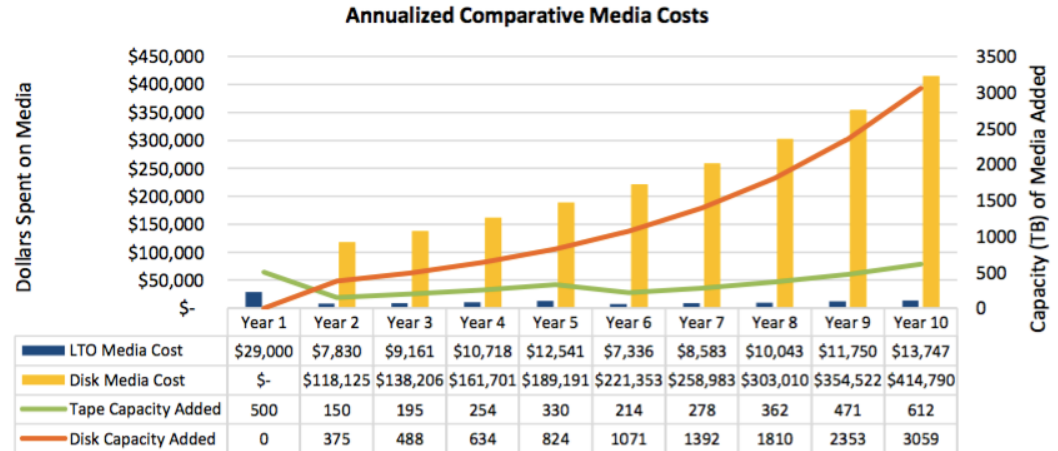


# Efficacious Storage...LTO Pays Back

## In a 10 Year TCO Study

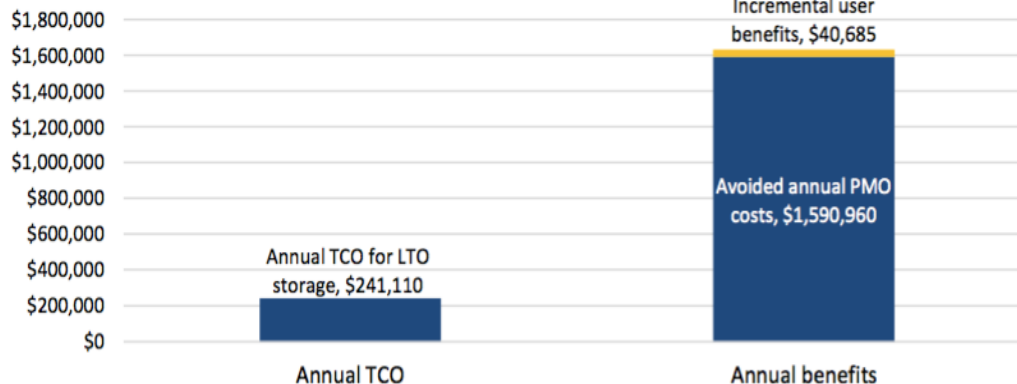
Disk Media costs raised by over **9X per year**

LTO media costs grew by less than **50%**



Source: Enterprise Strategy Group, 2016.

**Annual TCO and Benefit, LTO for Long-term Data Retention**

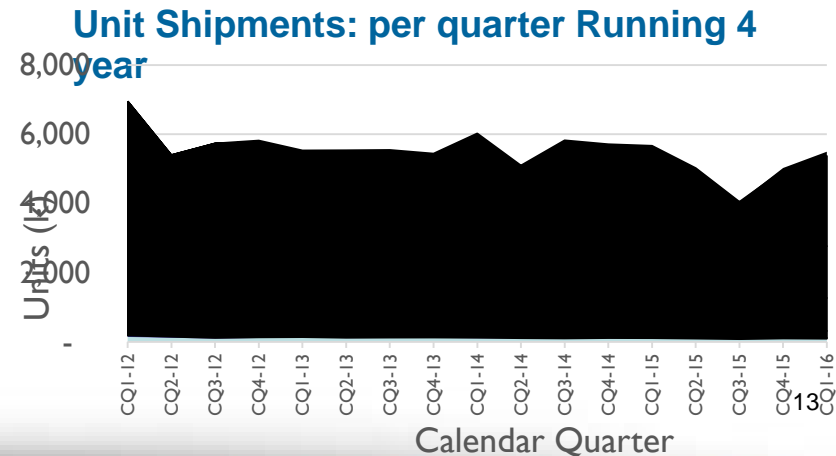
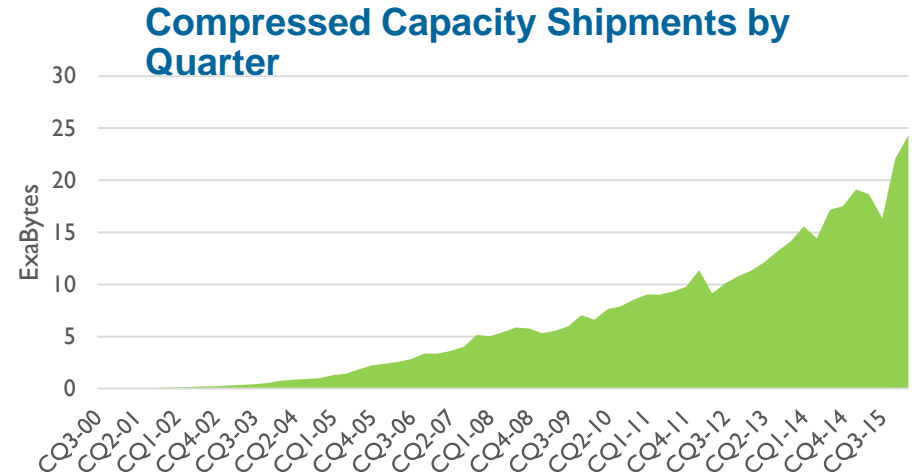


Source: Enterprise Strategy Group, 2016.

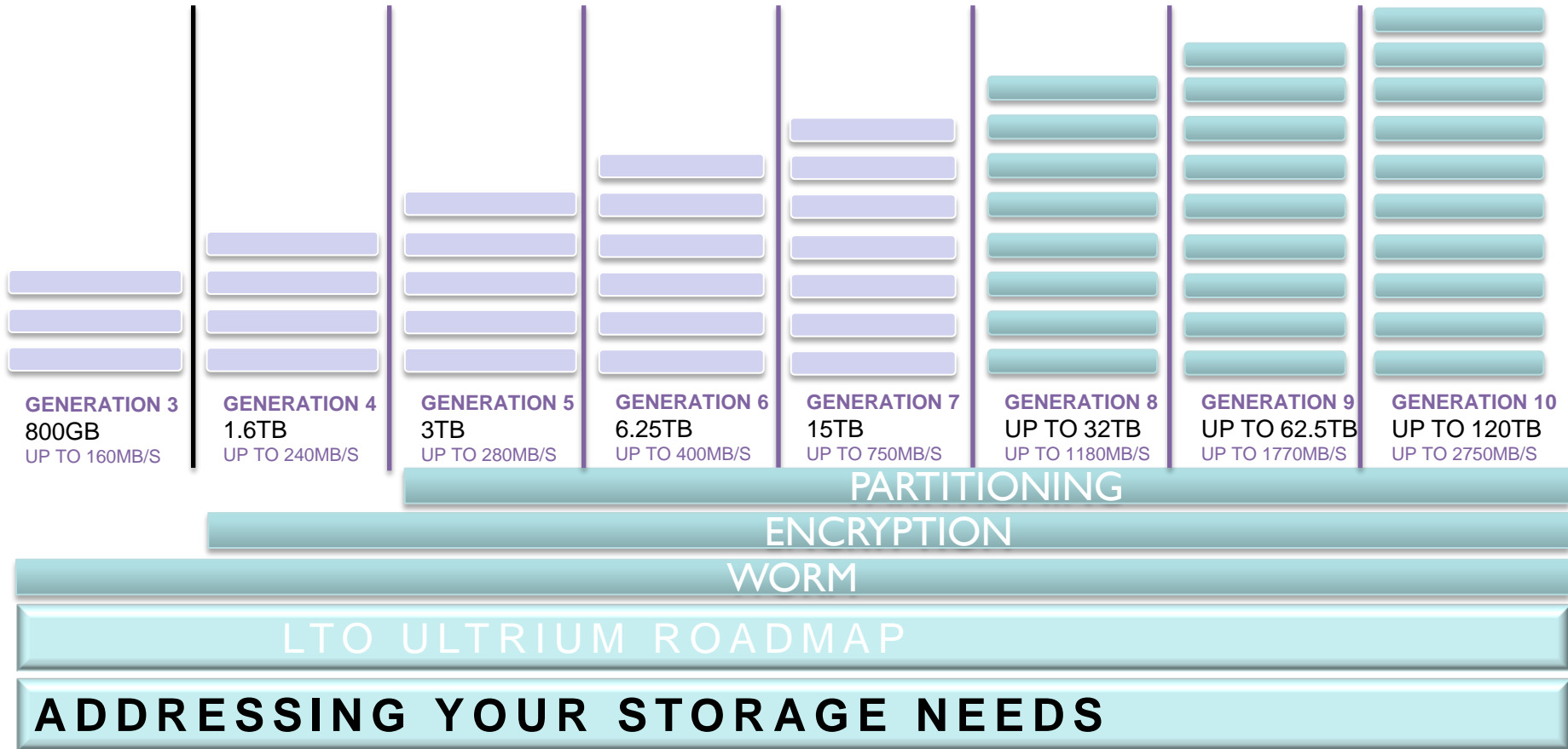
LTO has a **577%**  
Return On Investment!!

# Tape Market: Stable and Growing

- Shipped Capacity continues to Grow YTY by more than 17%
- Capacity shipped shows significant uptick in 1H2016
- Units shipped show signs of market stabilization
  - 2015 unit shipments were an anomaly
- Introduction of LTO7 is driving greater units of LTO6
  - Driven by Low cost of LTO6 media.
- Tape media exceeding capacity demands of the market.



# LTO Technology has a “BIG” Future



Note: Compressed capacities for generation 1-5 assume 2:1 compression. Compressed capacities for generations 6-10 assume 2.5:1 compression (achieved with larger compression buffer)  
 Source: The LTO Program, The LTO Ultrium roadmap is subject to change without notice and represents goals and objectives only  
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# LTO Exceeds Modern Business Needs

## PR<sup>2</sup>OPEL your storage

- **Protected** – Off-line content creates an “Air Gap” protection of data
- **Reliable** - Transform Archive data in to revenue generating content
- **Reduce Environmental impact** – Less replacement of media = less waste
- **Optimize** – Reduce time to data by up to 3X in streaming applications
- **Portable** – Share content in a standard format (LTFS)
- **Expandable** – Add archive storage with no capital expense
- **Low Cost** - Reduce Storage costs by up to 90% over traditional disk storage

# Q & A