

A more comprehensive TCO study

Money is only a tool. It will take you wherever you wish, but it will not replace you as the driver.” —Ayn Rand



An active archive helps organizations effectively integrate data into business processes in a cost-effective way

Business Processes



Intelligent Data Management



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Tape storage complements an active archive strategy

- Large cartridge capacities
- Robust technical roadmap
 - Recent INSIC report
- The “air gap”
- Long media life
- Portability
- Very low bit error rate
- Linear Tape File System
- Low energy requirements
- Fast sequential read/write speeds



... and the lowest TCO !

Total Cost of Ownership Tool Components

- Initial Acquisition Costs (Capex)
 - Hardware Purchase Price
 - Software Initial License Charges
 - Extended Warranties
- Operational Costs (Opex)
 - Maintenance and Support
 - Power and Cooling
 - Network
 - *New - Systems Management*
- Technology Refresh
 - Replace initial system with new technology



2019 TCO Tool enhancements

- Updated tape media to LTO 8
- Expanded the maximum user storage in the initial year to 100 PB
- Updated the disk system HDD's to 12 TB and 14 TB HDD's
- Updated the cloud storage costs to reflect the new Amazon Glacier Deep Archive and bulk retrieval service.
- Added a 5-year CAPEX and OPEX summary
- Added estimated storage management costs
- Available now at
 - https://www.fujifilmusa.com/products/tape_data_storage/tco_tool/index.html

Storage Management cost estimate

- Estimated the cost of storage management for cloud, tape and disk expressed as PB per Full Time Equivalent (FTE)
 - Tape and disk estimates based on survey of 7 customer
 - For Cloud, utilized the AWS IDC report
- Default is the average PB/FTE for each storage type
 - 42.6 PB/FTE for tape , 24.3 PB/FTE for Disk, 89 PB/FTE for cloud storage
- Default annual FTE cost is \$120,000
- Model also provides default values for annual systems management productivity and annual salary increases
 - 15% annual improvement in Systems Management Productivity, 3% annual salary increase

Only three inputs are required to generate a 10-year TCO

Enter the Following Information:

Quantity of data loaded in year 1 (TB): **50,000**

Enter total needed raw backup/archive data capacity in year 1. This tool is valid for capacities ranging from 200TB to 100PB.

Annual growth rate of stored data: **30%**

Enter estimated annual growth of backup/archive data capacity.

% of data retrieved each year: **12%**

Enter the portion of total data that needs to be retrieved (downloaded) each year.

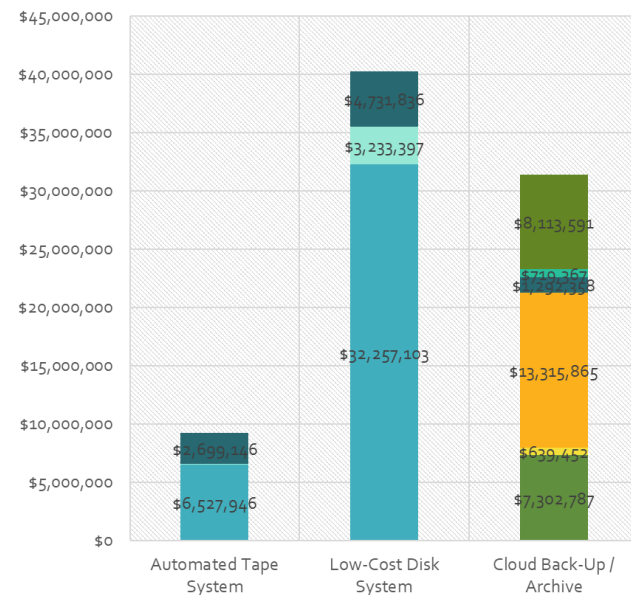
Your Tape System TCO Results:

Tape Savings versus Disk Storage: **77%**

Tape Savings versus Cloud Storage: **71%**

TCO Comparison

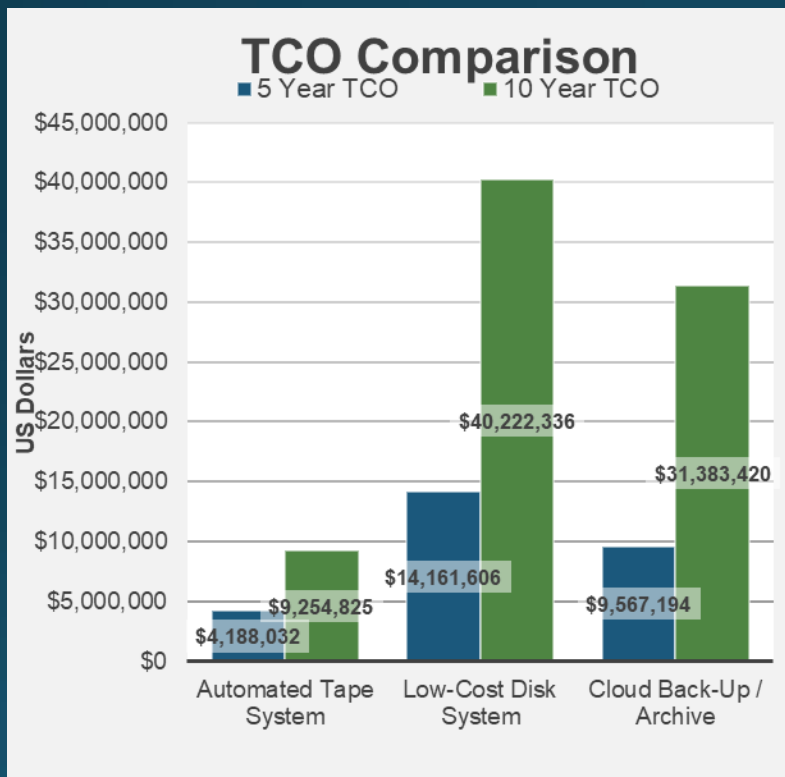
(10-Year Total)



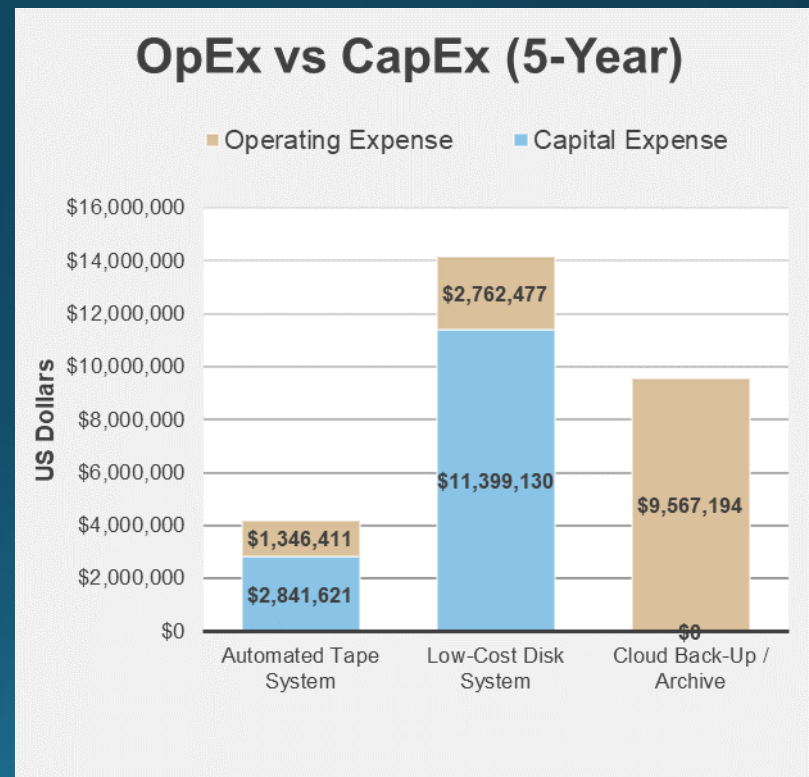
- Acquisition, including warranty
- Energy Costs
- Offsite Vaulting Costs
- Provider Storage Service Fees
- Provider Data Retrieval Service Fees
- Provider Data Transfer Service Fees
- Storage Management
- Provider Support
- Bandwidth

Additional summaries are also generated by the tool

5- & 10-Year TCO totals for all storage types



5-year Opex and CapEx for each storage type



50 PB, 30% CAGR, 12% Annual Retrieval Rate

Additional screen provides for customizing the variables for differing environments

All Formats

Copies 0

The tool will estimate costs of adding copies of data. For tape, copies are not included in libraries. Cost of copies for disk and cloud are the same as for primary archive data.

Energy cost (per KWH) \$0.105

Default cost is the average US commercial power cost from the U.S. Energy Administration.

Storage Management FTE Costs \$120,000

Fully burdened annual salary of FTE (Full-Time-Equivalent) personnel

Storage Management FTE Annual Salary Growth 3.0%

Storage Management Annual Productivity Improvement 15%

Annual increase in the amount of storage (PB) one FTE can manage.

Tape

Maximum number of cartridges per drive 200

The tool will estimate costs of adding copies of data. For tape, copies are not included in libraries. Cost of copies for disk and cloud are the same as for primary archive data.

% of cartridge copies stored in offsite vaults 50%

Only applies to Copies above.

Total average vault storage cost per cartridge (per month) \$0.600

Includes transportation (twice monthly pickups), handling, containers and storage. Only applies to "Copies" above.

Storage Management: PB managed per FTE 42.6

The default is 4

Storage Management FTEs (Year 1) 1.17



Disk and Cloud optional inputs

Disk

Storage Management: PB managed per FTE	24.3
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Storage Management FTEs (Year 1)	2.06
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Cloud Storage (Archive)

Average data request size (GB)	40.00
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Storage Management: PB managed per FTE	89.0
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Storage Management FTEs (Year 1)	0.56
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Cloud Bandwidth Needs

Cloud storage typically requires purchase of additional bandwidth to support upload/download. Below help to estimate the cost of additional bandwidth capacity.

Maximum desired time to download the 40 GB request (hours)	4.0	Additional bandwidth to the Internet. Bandwidth
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Bandwidth utilization multiplier	4.0	Uploads/downloads Mbps much more bandwidth is
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Bandwidth costs (\$ per Mbps per month)	\$1.59	Bandwidth cost is based analysis/fixed-broadband
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Calculated additional bandwidth capacity in year 1 (Mbps)	6,693
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Tape continues to be the low-cost solution for smaller environments

Enter the Following Information:

Quantity of data loaded in year 1 (TB): **1,000**

Enter total needed raw backup/archive data capacity in year 1. This tool is valid for capacities ranging from 200TB to 100PB.

Annual growth rate of stored data: **30%**

Enter estimated annual growth of backup/archive data capacity.

% of data retrieved each year: **12%**

Enter the portion of total data that needs to be retrieved (downloaded) each year.

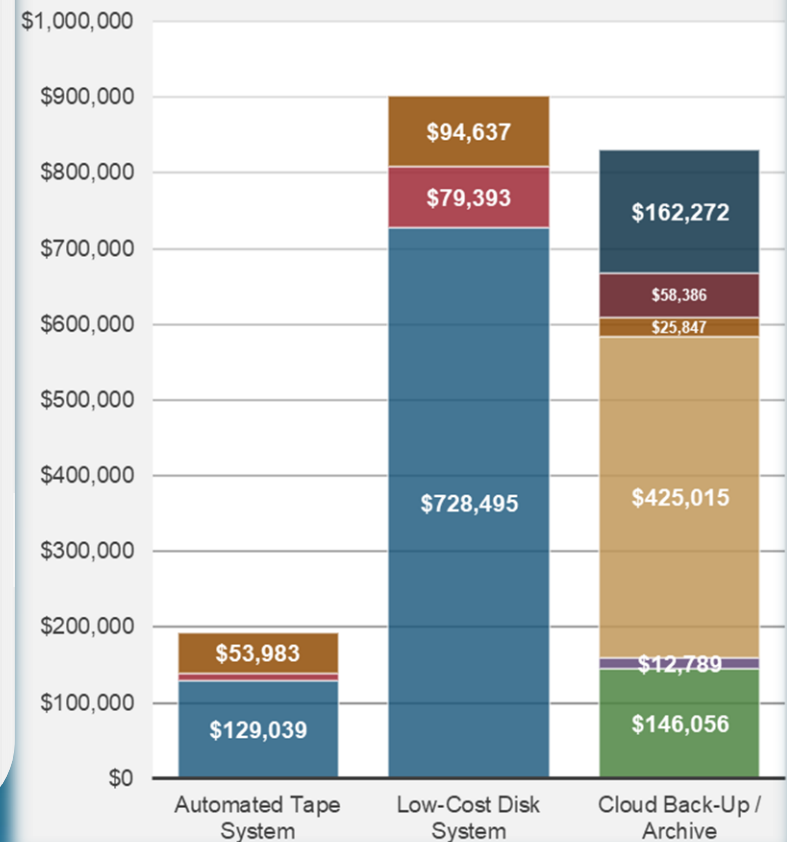
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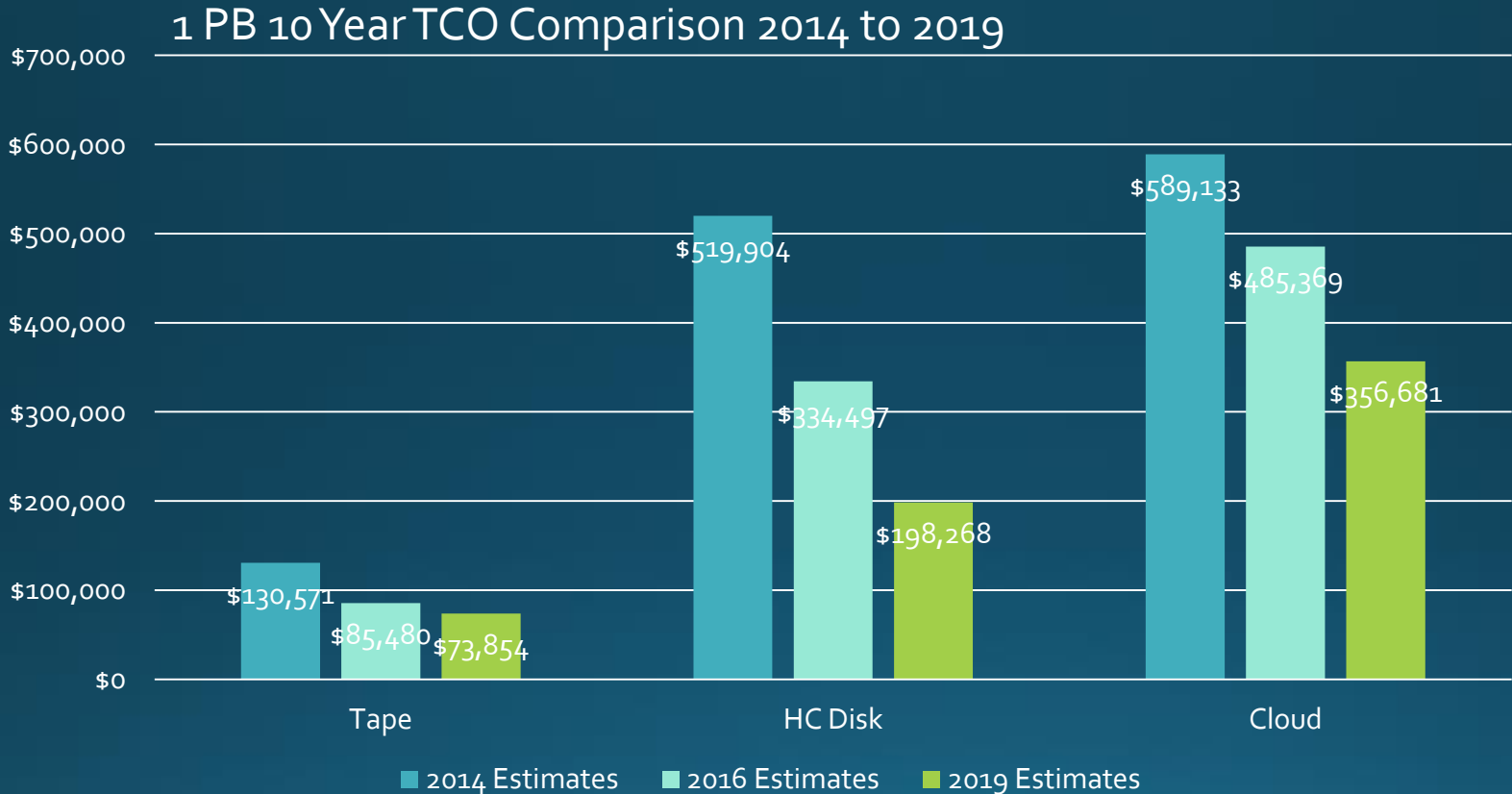
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TCO Comparison

(10-Year Total)



A historical perspective of TCO



1 PB, No growth, 12% Annual Retrieval Rate

Note: Network and System Management were not included in 2019 in order to be consistent with prior methodologies

Conclusions

- The very large quantities of digital data being created today are demanding new methods of intelligent data management
- Tape storage is an essential component of an intelligent data management strategy
- Tape offers a compelling TCO across a wide range of capacity needs
- The new version of the TCO tool provides a quick method for identifying the potential savings associated with tape storage

A person wearing a dark blue suit jacket and a white shirt is holding a white rectangular sign with both hands. The sign has the word "QUESTIONS?" written on it in a large, bold, dark blue, sans-serif font. The background is a solid dark teal color.

QUESTIONS?