



Flash Memory Summit

# Flash Memory Summit 2017 Market Research Panel

Industry Analysts Discuss  
The Worldwide Flash Market And  
Customer Adoption of Flash



Flash Memory Summit

# Industry Analyst Panel

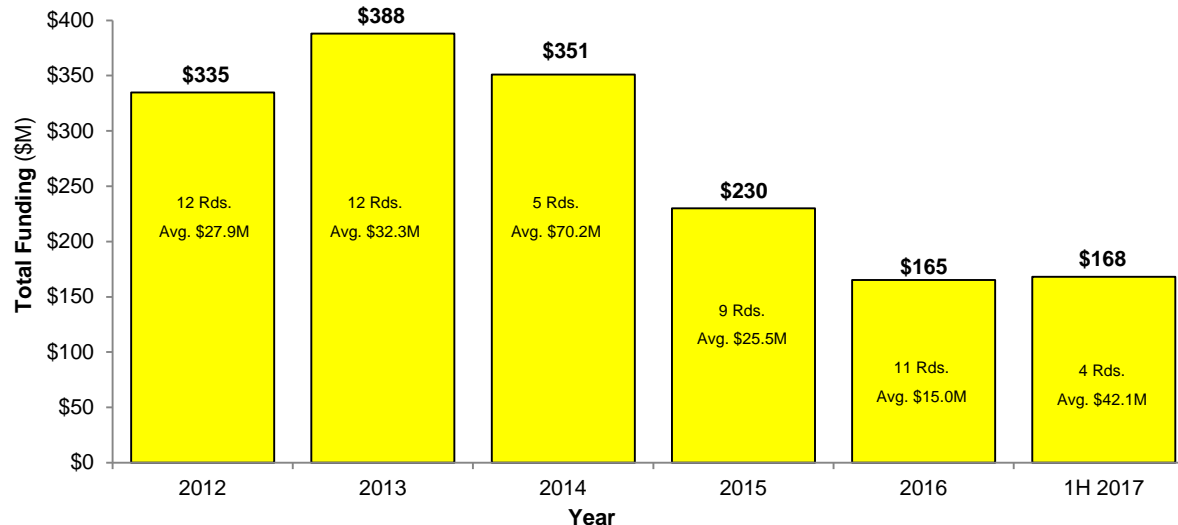
- Moderator: John Rotchford, SASI
- Camberley Bates, Evaluator Group
- Jean S. Bozman, Hurwitz & Associates
- Chris DuPuy, The 650 Group
- Jim Handy, Objective Analysis
- Eric Burgener, IDC

**Flash Memory Venture Funding  
&  
M&A Insights  
August, 2017**

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# Flash Memory Venture Funding

2016 ended strong with 11 rounds totaling \$165M with an average of \$15.0M per round, while 2017 is off to a strong start with 5 rounds totaling \$168M...

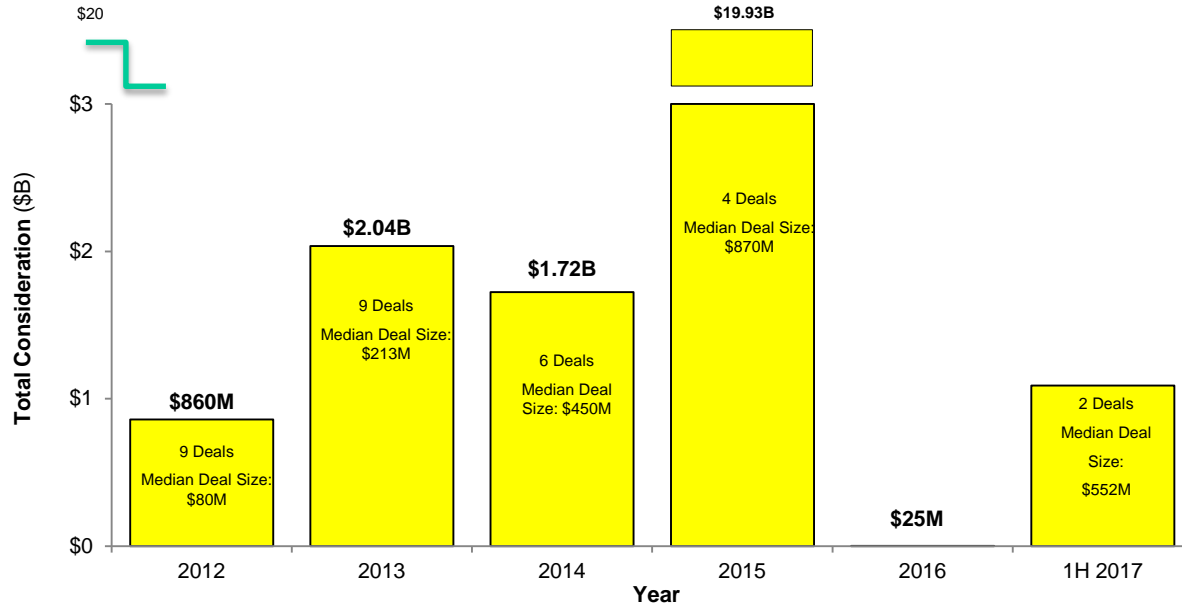


## Top Five Rounds

Violin Memory, \$50M 6 <sup>th</sup> Nimble Storage, \$40.7M 5 <sup>th</sup> Pure Storage, \$40M 4 <sup>th</sup> STT, \$36M 1 <sup>st</sup> Avalanche Technology, \$30M 3 <sup>rd</sup>	Pure Storage, \$150M 5 <sup>th</sup> Skyera, \$52M 2 <sup>nd</sup> Crocus Technology, \$45M Later Tegile, \$35M 3 <sup>rd</sup> SolidFire, \$31M 4 <sup>th</sup>	Tintri, \$75M 5 <sup>th</sup> Pure Storage, \$225M 6 <sup>th</sup> Permixon, \$35M 3 <sup>rd</sup> Reduxio, \$15M 2 <sup>nd</sup> NVMDurance, \$1M 1 <sup>st</sup>	Tegile, \$70M 4 <sup>th</sup> Crossbar, \$35M 4 <sup>th</sup> Nantero, \$31.5M 5 <sup>th</sup> Everspin Tech., \$29M 2 <sup>nd</sup> Crocus, \$21M 5 <sup>th</sup>	Elastifile, \$50M 2 <sup>nd</sup> Diablo Tech, \$37M 3 <sup>rd</sup> Avalanche Tech, \$23M 6 <sup>th</sup> Nantero \$21 6 <sup>th</sup> E8 Storage, \$12M 2 <sup>nd</sup>	Kaminario \$75M 5 <sup>th</sup> CNEX Labs \$38M 3 <sup>rd</sup> Tegile \$33M 5 <sup>th</sup> Reduxio \$22M 3 <sup>rd</sup>
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1H 2017 funding was concentrated in Systems, which accounted for 77% or \$130M of total funding and Later stage which accounted for \$108M or 64%. The only other funding in 2017 was in Components for CNEX Labs at \$38.2M

# Flash Memory M&A Transactions

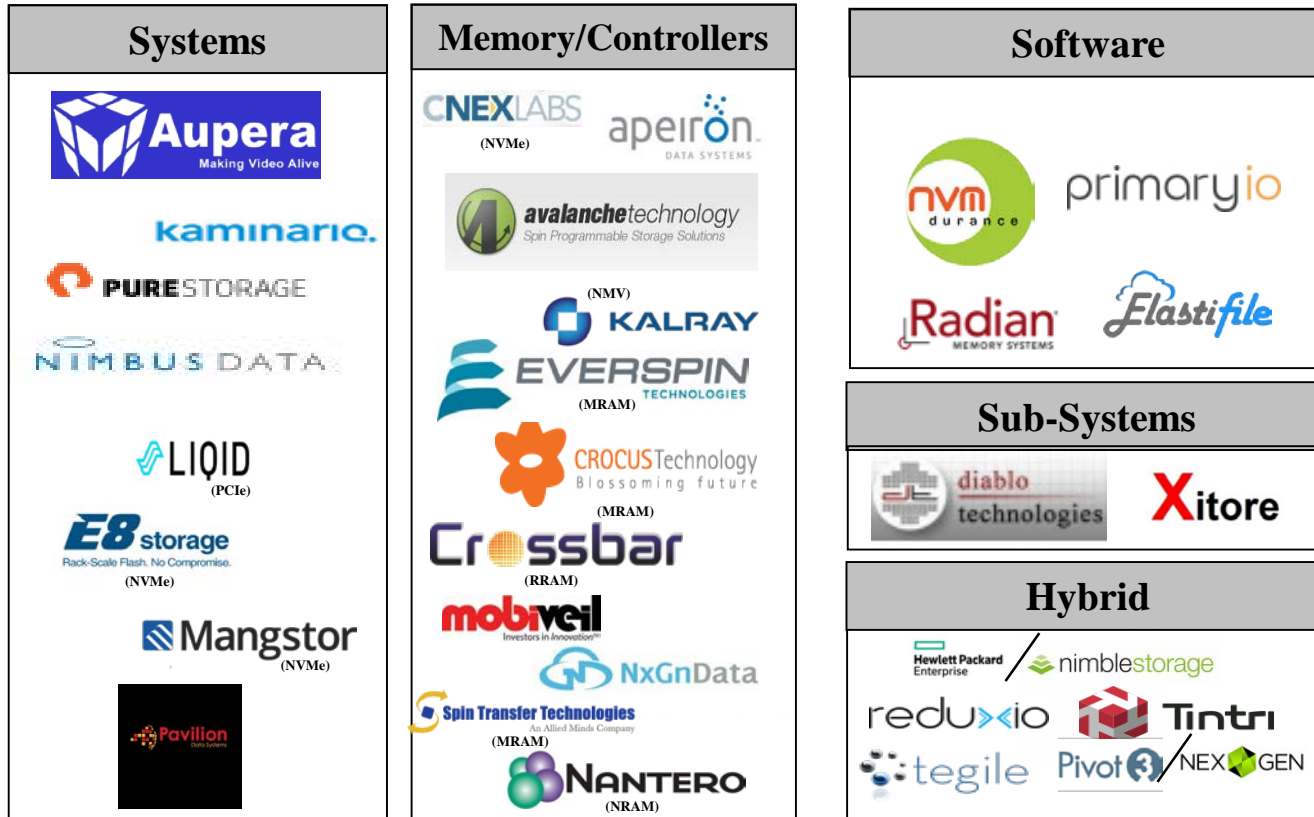


## Top Deals

EMC/XtremIO, \$430M IBM/Texas Memory Systems \$250M NetApp/CacheIQ, \$90M SanDisk/FlashSoft, \$70M	WD/Virident Systems, \$645M Cisco/WhipTail, \$415M WD/STEC, \$340M SanDisk/SMART Storage Systems, \$307M Fusion-io/NextGen, \$119M	SanDisk/Fusion-io, \$1.1B Seagate/LSI, \$450M EMC/DSSD, \$150M	WD/SanDisk, \$19.0B NetApp/SolidFire, \$870M Silicon Motion/Shannon Sys, \$57.5M	Nutanix/PernixData \$25.3M Pivot3/NexGen Stg Kingston/Imation	HPE/Nimble Storage \$1.1B Quantum/Violin \$14.5M
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# Flash Memory Venture Market Map

There are still a healthy number of start-ups looking to shake up the industry....





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# Evaluator Group

Camberley Bates

Managing Director / Analyst

@camberleyb



# Solid State in the Enterprise

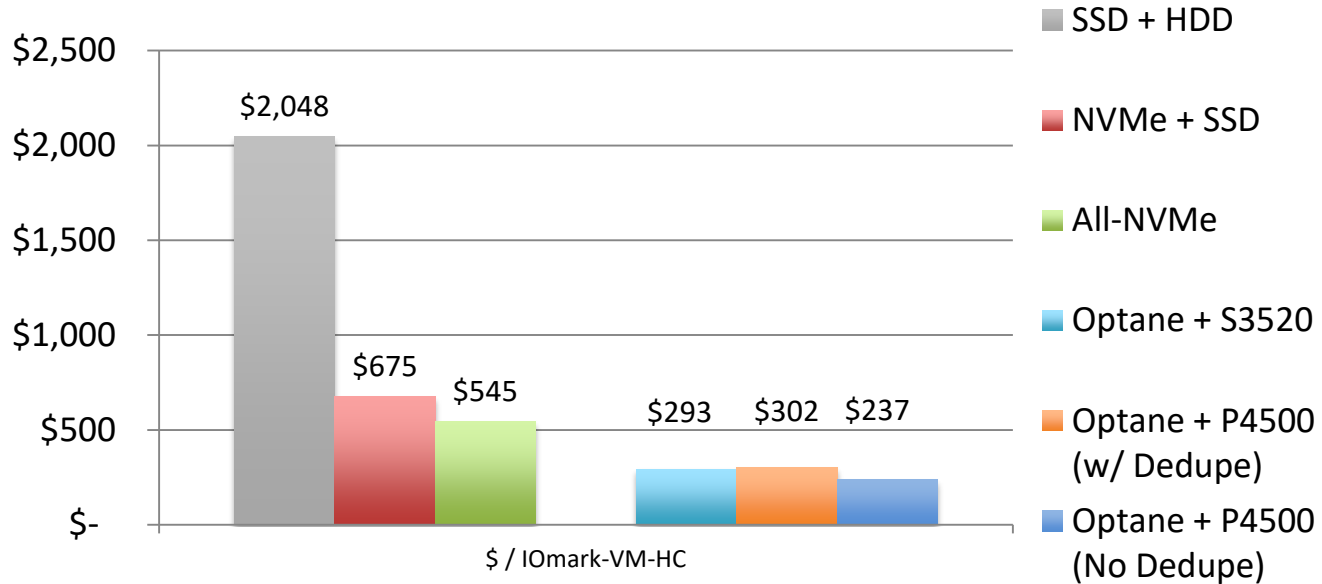
- Tier -1 Storage System are All Flash in the next 3 years driven by the Economics of Flash
  - Price / Performance
  - Longer life cycles ~5 years
  - Forward, non-disruptive migrations
- New decision criteria - OPEX





# Benchmark and Price Performance

## Price / Performance: 4-Node HC





# Tier -2 in the Enterprise

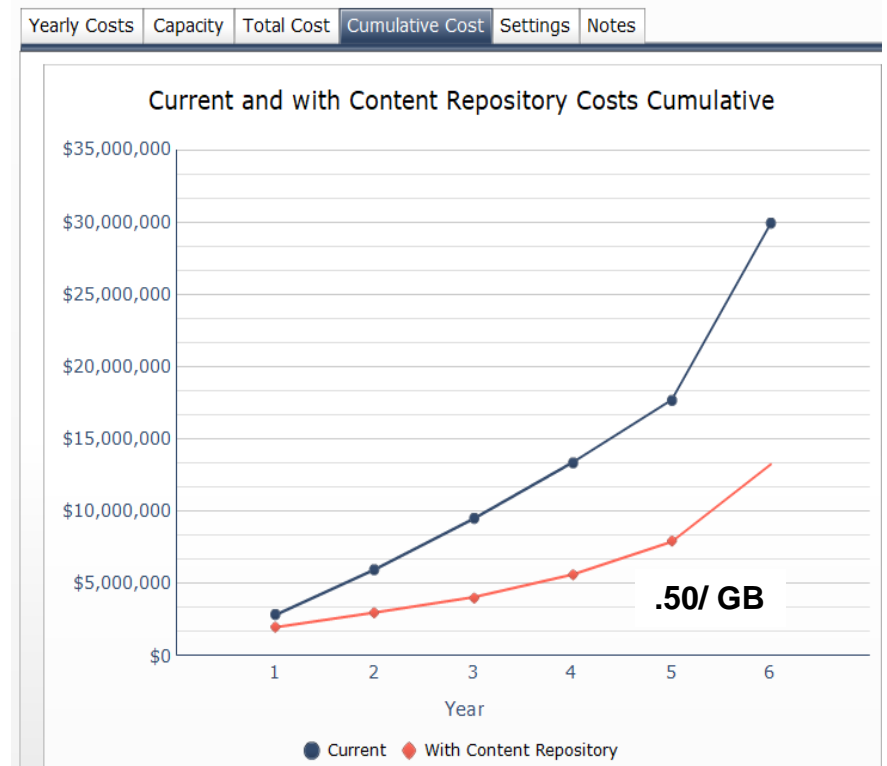
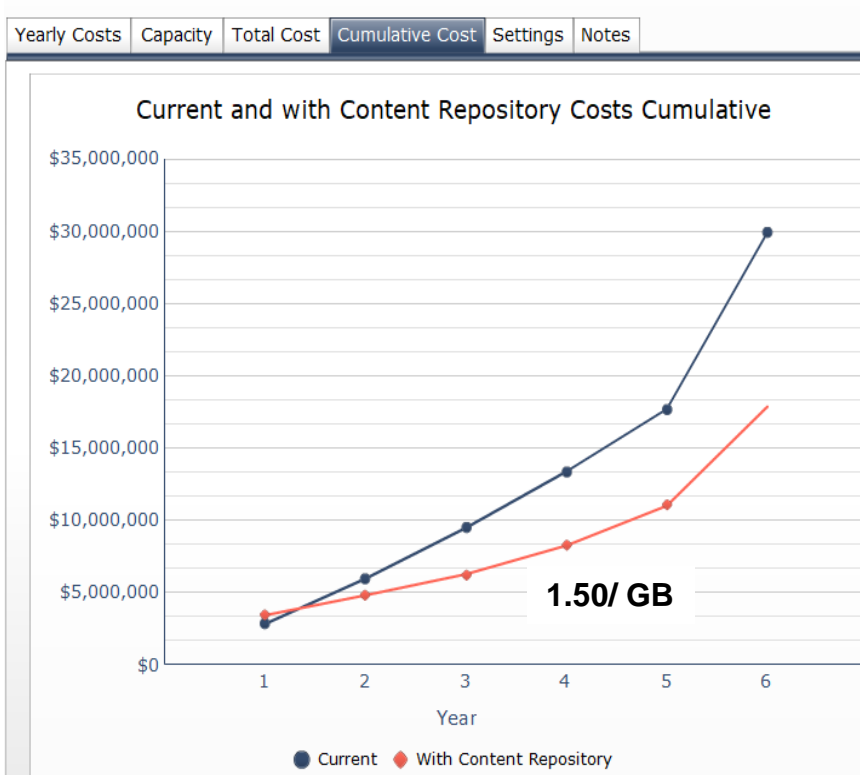
- Changing requirements for Long Term Archive and Content Repository
  - Keep forever
  - “HPC - in the Enterprise” for Machine Learning / AI



- Tier-1 housekeeping



# 100TB changes the economics





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**HURWITZ  
& ASSOCIATES**  
Insight to Action

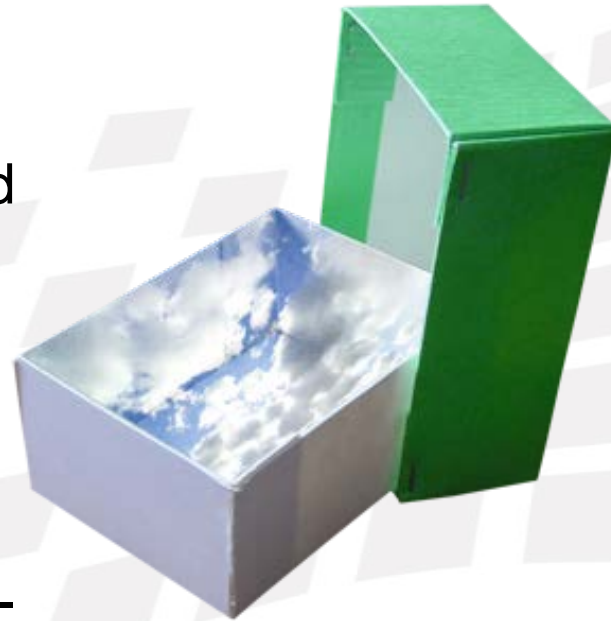
# Growth in Flash Adoption Is Linked to Infrastructure Refresh

Jean S. Bozman  
Vice President and Principal Analyst  
Hurwitz & Associates

- Revolution in the IT Data Center Leverages Flash Devices
  - Consolidate, Simplify, Reduce
  - Cleaning Up Database Sprawl
  - Pushing More Apps to the Cloud
    - High-Capacity Flash Arrays and Fewer IT Data Center Footprints
    - Racks of Scale-Out Capacity for Hyperscale Workloads

# Hybrid Clouds Tap Data Differently

- Gathering More Data from Non-Traditional Data Sources (Social Media, IoT)
- Integrating Services and Data Across Environments (Transactional, Mobile)
- Data Locality, HA and Security are Chief Considerations for Next-Gen Data Centers



- Evolution of New Infrastructure
- New Network Fabrics
  - Leveraging NVMe, Multiple Protocols to Achieve Faster End-to-End Data Transfers
- New Applications (Still) Need Security, HA
- New Databases in the Mix
  - Examples: MongoDB, Cassandra
- Establishing Beachheads in Large Organizations; Adoption Will Take Time



# The Business Impact of Hybrid Cloud

- Gathering more data for Rapid Decisions, Business Agility
- More Need for Fast, Persistent Storage
  - Financial, HPC, Retail/Credit
- Business Is Demanding Faster Response from Storage Resources



# Contact Information

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# Storage Infrastructure Trends

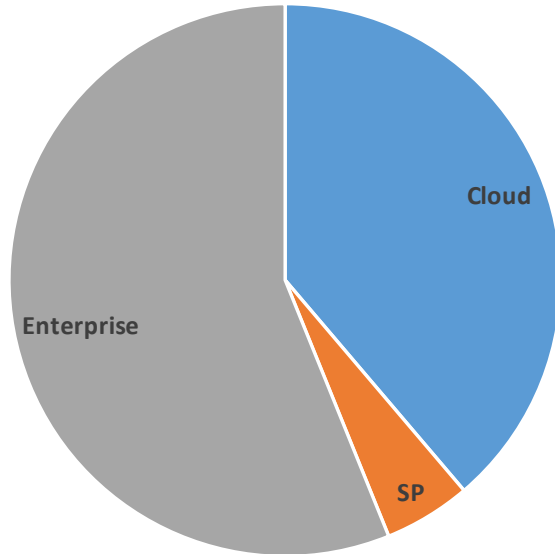
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Research Panel

Chris DePuy

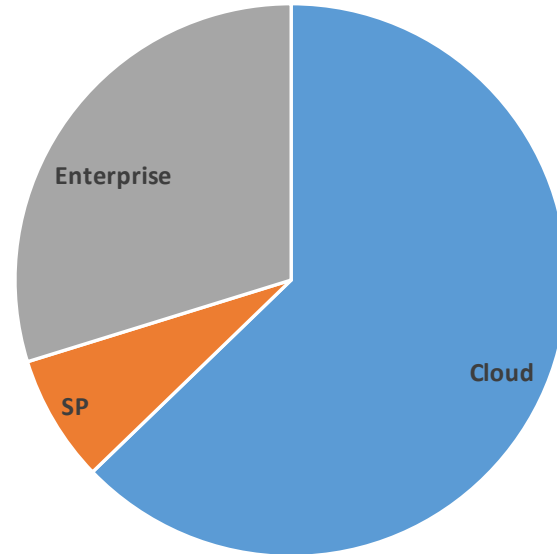


# Capex Trends IT Equipment

2015

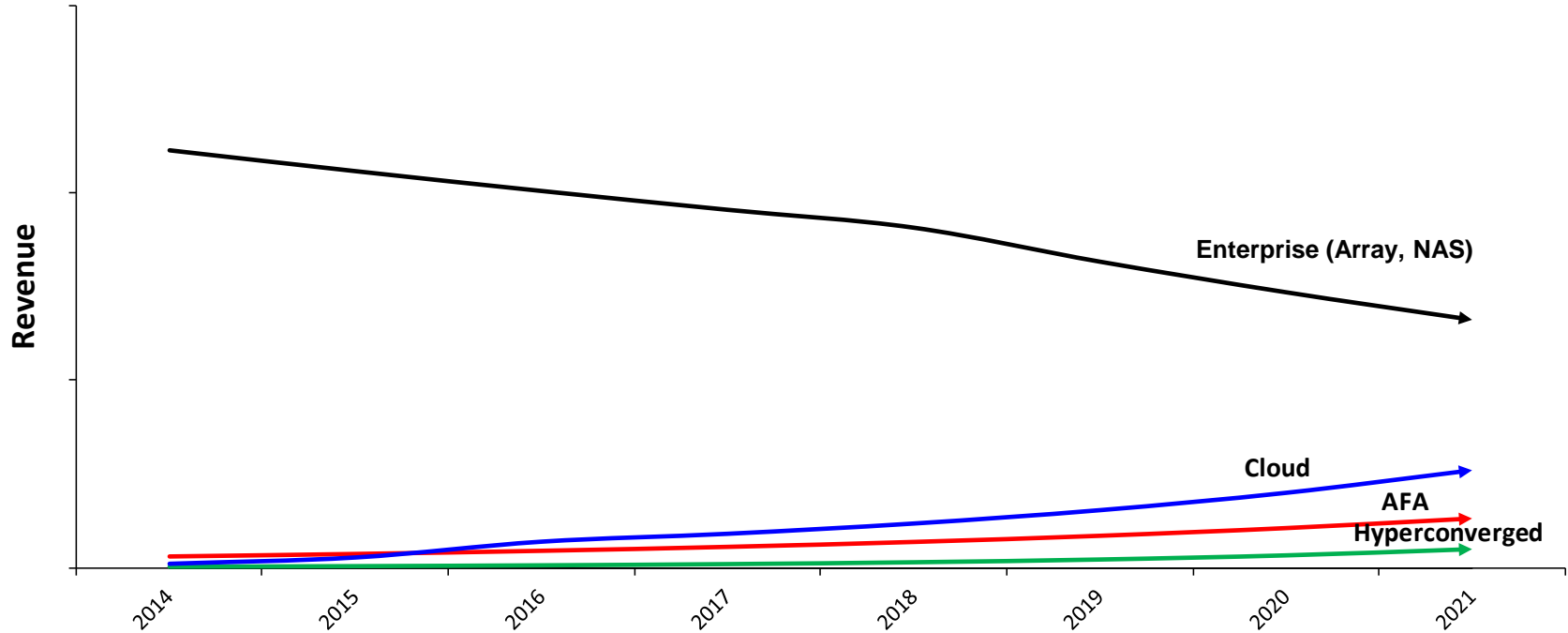


2021





# Storage Infrastructure Trends





# Storage – Other Trends

- Storage systems industry shrinking
  - Hyperscalers buy components
  - Hyperscalers make own software
- Flash-based VDI at hyperscalers 90% as good as business desktop computing
- Enterprises will buy systems
- NVMe #winning



# About 650 Group

- Founded in 2017 by Chris DePuy and Alan Weckel
- Headquartered in Silicon Valley
- Trusted source of research for system vendors, component manufacturers, service providers, sell-side, buy-side, and standards bodies
- We research the data center, communications and Information Technology markets.



# The End of the “Super Cycle”

Jim Handy

OBJECTIVE  
ANALYSIS



# Today & Tomorrow



## **Today: 2017**

- NAND Shortage
- DRAM Shortage
- Other Shortages
- High Prices
- Huge Growth

## **Tomorrow: 2018**

- NAND Oversupply
- DRAM Oversupply
- Other Oversupplies
- Price Collapse
- Market Downfall

# What Drives the Next Downturn?

- Stable prices to mid-2018
  - Collapse once 3D becomes cost-competitive
  - Stable prices drive profits
  - China not a factor until downturn
- 2018 price collapse
  - Overcapacity from 3D NAND efficiency
    - Drives downstream DRAM overcapacity
    - ... which drives foundry overcapacity
  - Biggest-ever collapse
    - Caused by largest-ever price-cost gap

# The Longer The Shortage, The Bigger The Collapse!



# Extension is Hard to Predict



- When will 3D be mastered?
  - Everyone is shipping
    - ...but 3D costs are still higher than planar
- Vendors project 50/50 Planar/3D mix by end of 2017
  - Some may achieve this
- Our guess: 3D NAND mastered by mid-2018



# Thank You!

**Jim Handy**

**(408) 356-2549**

**Jim.Handy(at)Objective-Analysis.com**

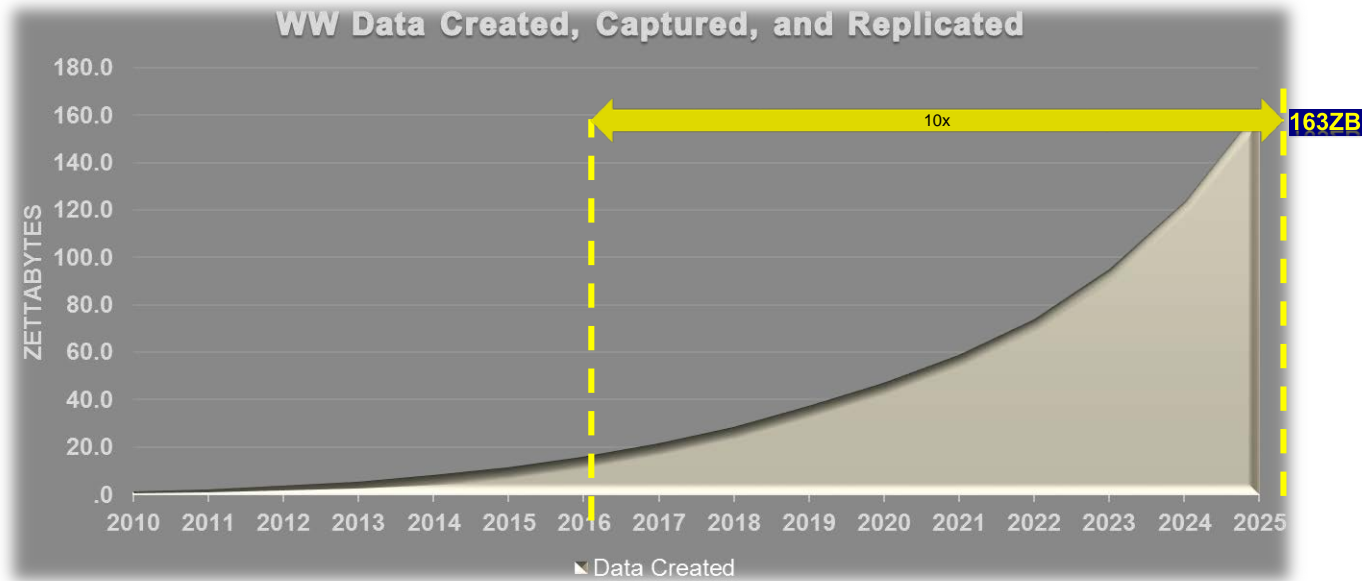
**OBJECTIVE  
ANALYSIS**



Eric Burgener  
Research Director, Storage

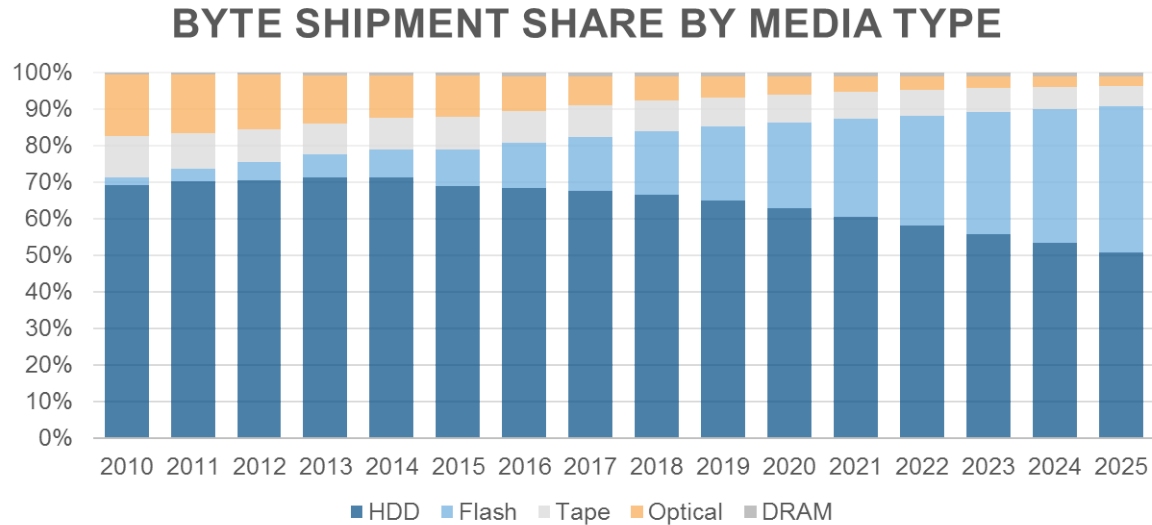
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# The Global Datasphere



Source: IDC Data Age 2025 Study, sponsored by Seagate

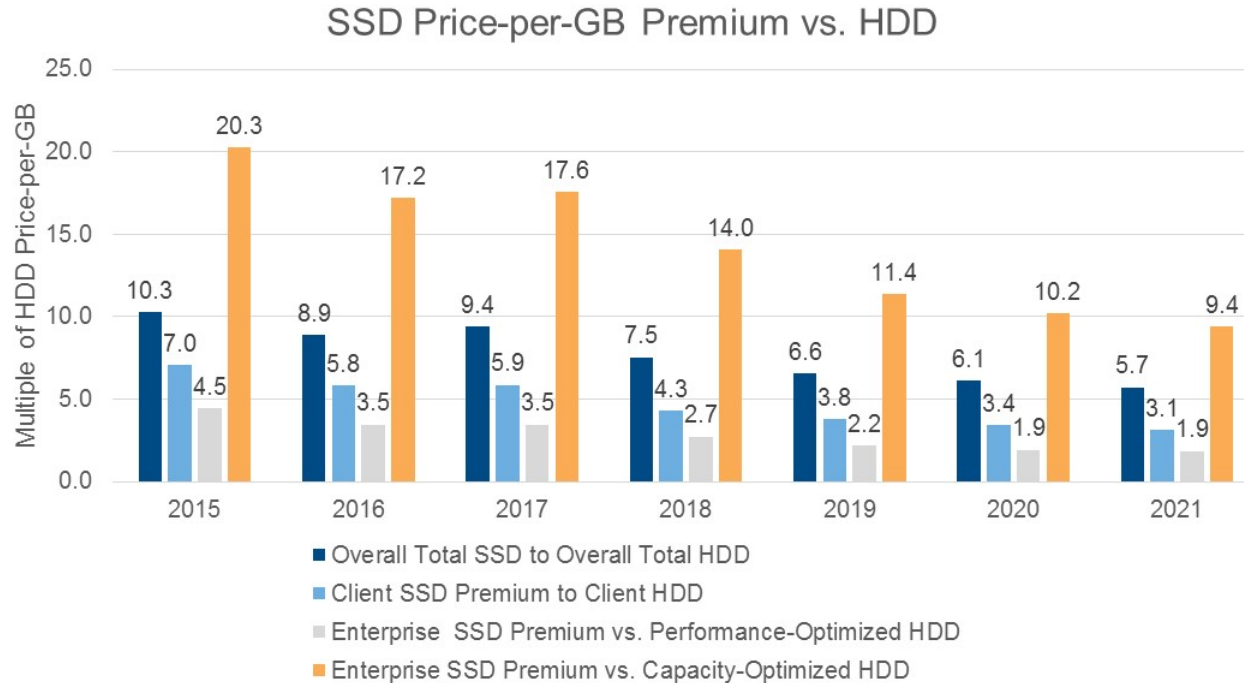
# Flash Demand is Increasing



Source: IDC Data Age 2025 Study, sponsored by Seagate



# SSD Price Premiums Continue to Narrow versus HDDs



# WW SSD Unit Shipment Forecast

