



# HGST Corporate & Product Update

**Marcin Paczko**

**Country Manager CEE**

**mail: [marcin.paczko@hgst.com](mailto:marcin.paczko@hgst.com)**

**mobile: +48 601 333 928**

**skype: leon.zaw**

# Industry Leading Combination Company Formation



HGST and WD will maintain separate sales teams and separate product brands

# What MOFCOM Decision Was Handed Down?

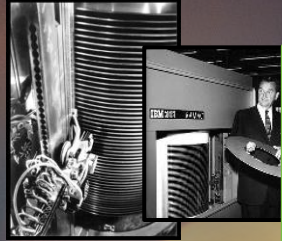


中华人民共和国商务部  
MINISTRY OF COMMERCE OF THE PEOPLE'S REPUBLIC OF CHINA

- MOFCOM has approved substantial portions of the integration of Western Digital Corporation and HGST and WD
  - Must maintain separate WD and HGST brands and sales teams for two years
- Integration activities have commenced
- Western Digital Corporation is committed to prioritizing business continuity and minimizing any disruption to our valued customers and suppliers
- Western Digital Corporation will communicate progress of integration activities, as appropriate



Harness the power of data to **unlock** greater business potential.



1956 –  
RAMAC  
Inventor  
Hard D

1950

1962  
Hydrodynamic  
Air Bearing  
Sliders

## HGST Active Archive System

**4.7PB** Object Storage  
System.

Making cloud storage more  
affordable, scalable and  
accessible than ever before.



1978  
First disk array  
subsystem patent

1973  
Winchester Disk  
IBM 3340 – father  
of the modern HDD



1997  
heads



4

1M hr MTBF

1997  
Ramp Load/Unload



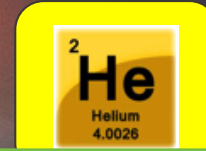
## HGST HelioSeal Platform

World's first **helium** filled hard drives.

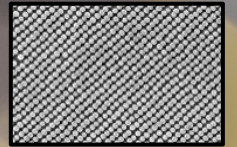
Driving down data center TCO with highest  
capacity, lower power, cooler  
and quieter operation.



2004  
First 5-platter  
3.5" design



2010  
First 7200 RPM  
7mm 2.5" HDD



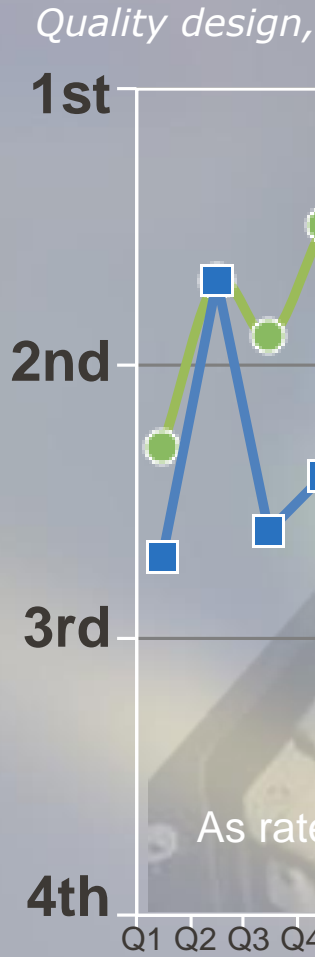
2013  
10-nanometer  
Patterned-Bit  
Milestone

Today

7200 RPM  
Enterprise HDD with  
2M hr MTBF rating

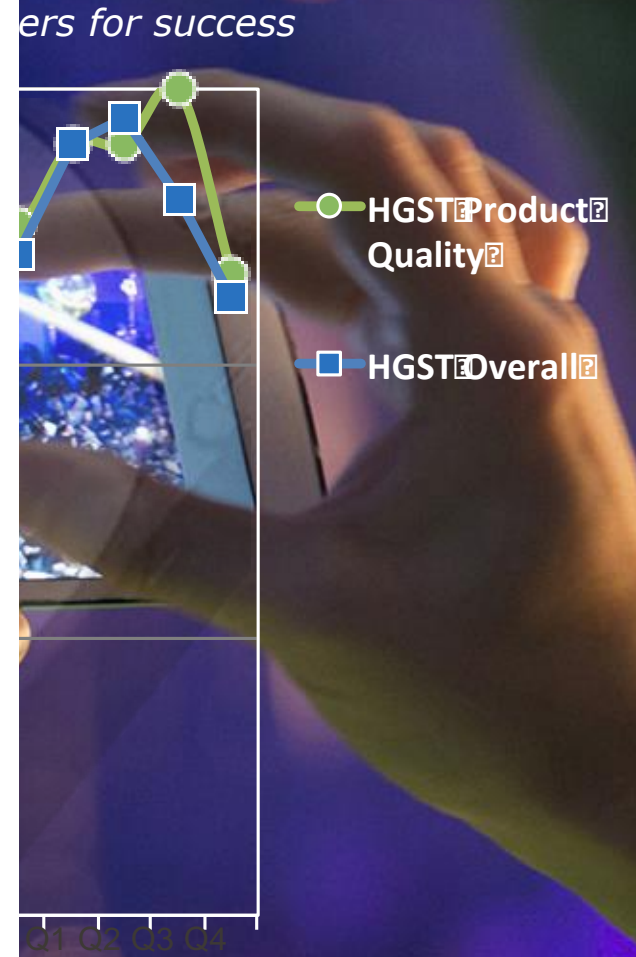
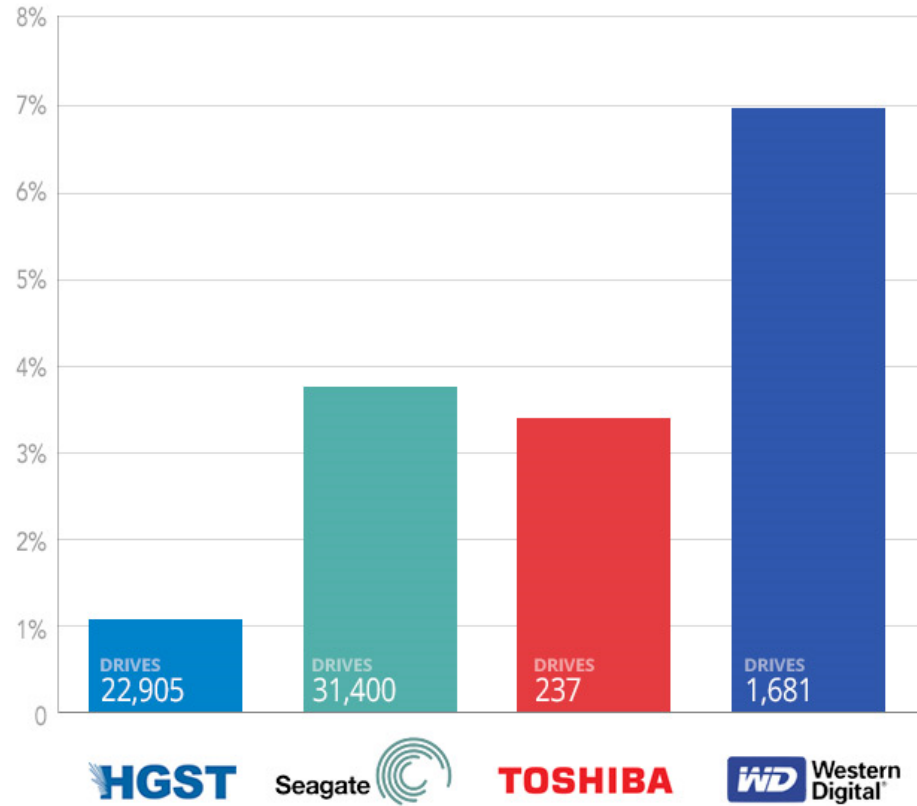


Supplier Rankings



## Failure Rate by Manufacturer

Cumulative from 4/2013 to 12/2015



BACKBLAZE

2009

2010

2011

2012

2013

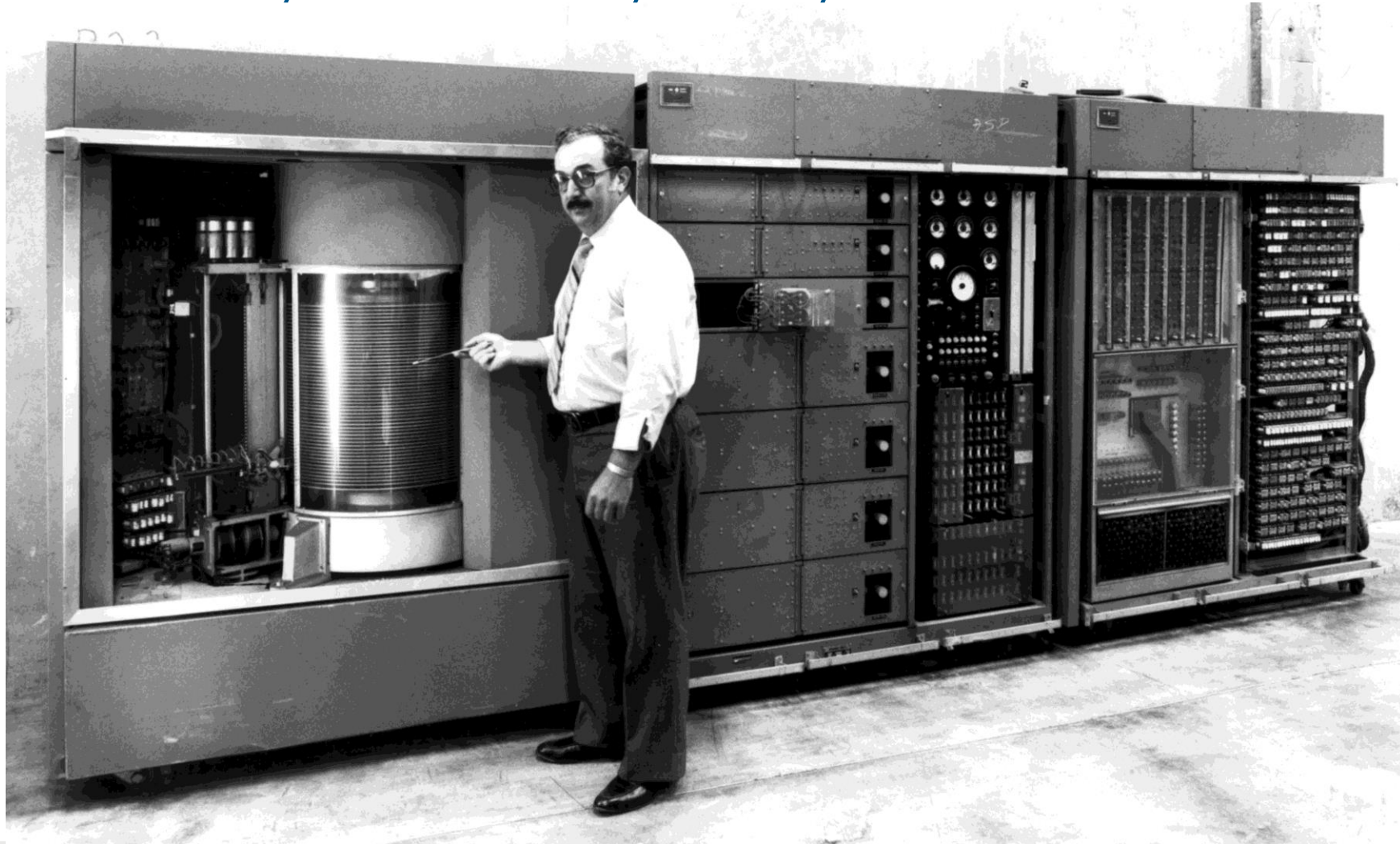
2014

2015

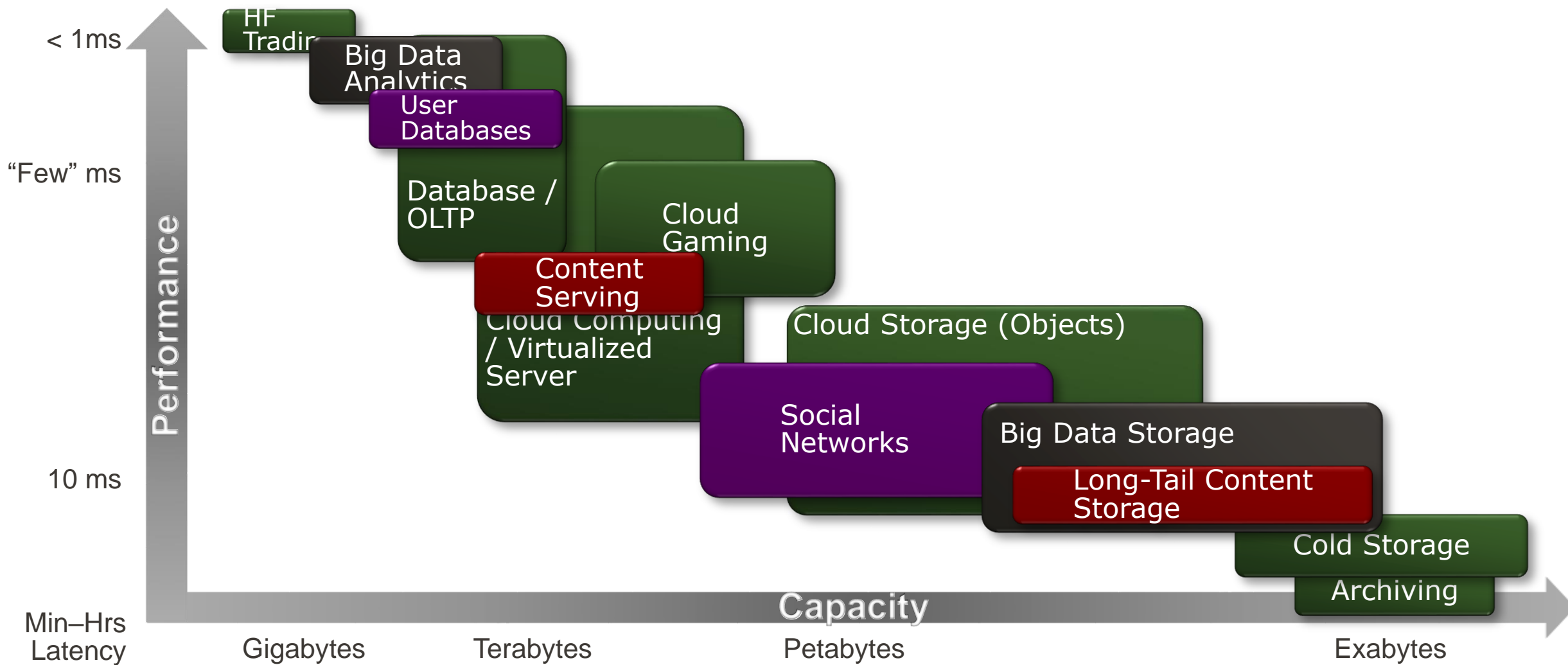
Source: HGST Customer Quarterly Business Reviews



In the early days, all HDDs were enterprise HDDs ... but today  
And you knew exactly where your data was . . .



# Many Applications – more expectations



# Market Leadership

## Cloud & Data Center

### Performance Enterprise

FlashMax® & Ultrastar®

Ultrastar®  
10K & 15K HDDs



Enterprise SSD PCIe & SAS

### Capacity Enterprise

Ultrastar® & MegaScale DC®



Active Archive –  
4,7PB  
Object  
Storage  
system

JBODs



## Mobile

### Computing

Travelstar®

9.5mm and  
7mm drives



5400 & 7200 RPM HDDs

### Consumer Electronics

CinemaStar®

9.5mm and  
7mm drives



5400 & 7200 RPM HDDs

### Automotive & Industrial

Endurastar®

9.5mm drives



4200 RPM HDDs

## External Storage

### Creative Professional

G-Technology®



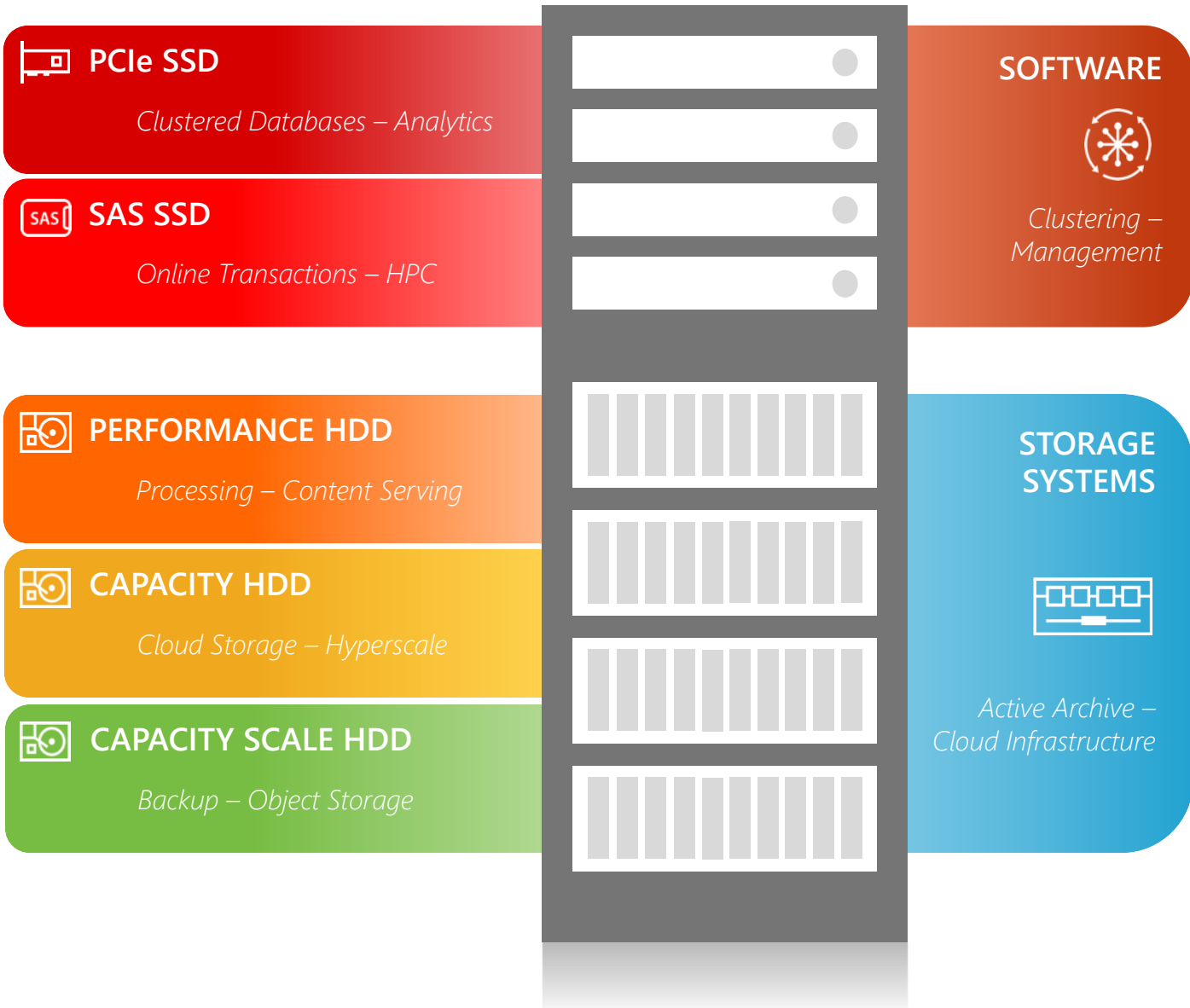
### Consumer

Touro™





# ULTRASTAR™



# We are storage.

In 1956, we invented the world's first hard drive.

We didn't stop there.

Today, HGST innovates at every level of the storage stack – from the fastest solid-state drives to the densest storage systems on the planet.

# Data Center Storage | A tale of two halves

Modern data centers will continue to deploy both SSDs and HDDs



**HDDs**  
for Capacity



**SSDs**  
for Performance

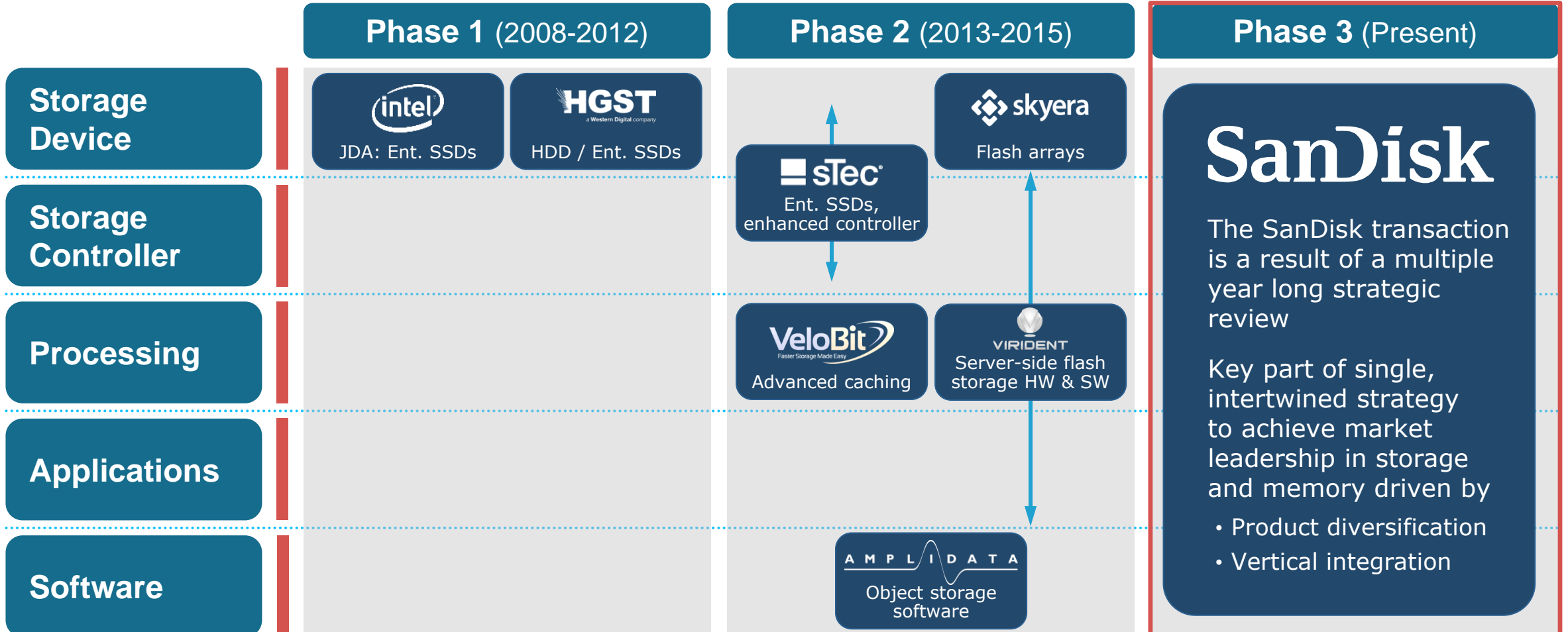
- Need to deploy a combination of both to find optimal balance of capabilities and cost
- At-scale application needs determine storage performance, and therefore level of SSD mix





# Executing on Our Strategic Priorities

## Recent Acquisitions



Expanding our capabilities and investing for ongoing growth

# Ultrastar® SSD800/SSD1600M

## Enterprise Class SAS SSD



- **High endurance**
  - 2, 10, 25 DW/D for 5 years
- **Capacities**
  - 1.92TB, 1.6TB, 800GB, 400GB, 200GB, and 100GB
- **2.5M MTBF**
  - Industry's highest rating
- **12Gb/s SAS**



**FAST  
PERFORMANCE**



**HIGHEST  
RELIABILITY**



**TECHNOLOGY  
INNOVATION**



**SECURED  
ENCRYPTION**

# Ultrastar® SN100 Series

## Accelerating Application Performance With NVM Express™

Ultrastar SN100 Series drives the next wave of server flash adoption with simplified system integration paired with HGST's renowned quality and reliability.

### FAST PERFORMANCE

- Up to 743,000 read IOPs
- 3.0 GB/s Read
- < 20us latency

### FLEXIBILITY

- HH-HL or highly-serviceable 2.5" SFF

### HIGH CAPACITY

- From 800GB Up to 3.2TB in SFF and HH-HL

### SOFTWARE INNOVATION

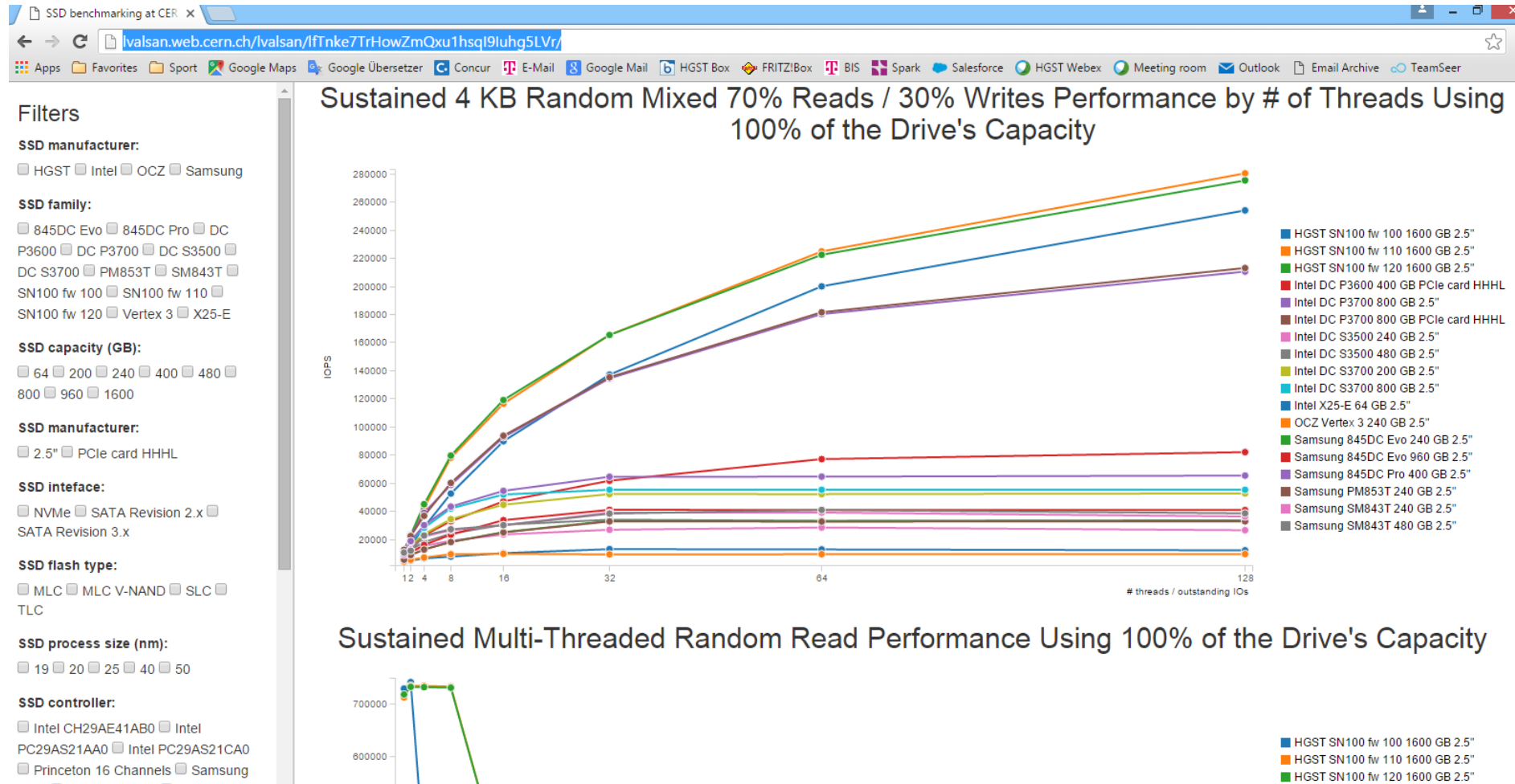
- Clustering, HA, & Advanced Caching





# CERN Performance

<http://lvalsan.web.cern.ch/lvalsan/lfTnke7TrHowZmQxu1hsqI9Iuhg5LVr/>



# End-to-End Storage Performance Enterprise Portfolio

## 15K RPM

**Ultrastar® C15K600**  
**600GB**



World's fastest hard drive



## 10K RPM

**Ultrastar® C10K1800**  
**1.8TB**



Industry's highest 10K capacity

**Highest  
Performance**

**Highest  
Capacity**



Highest Reliability



Technology Innovation



Security Encryption



12Gb/s SAS

# HGST Ultrastar® 7K6000

## Capacity Enterprise HDD



- **Best-in-class**
  - 50% more capacity, with 30% less power over previous generation
- **Industry's highest MTBF rating**
  - 2M hours
- **New technology and features**
  - Media Cache
  - Instant Secure Erase

### 7K6000

<b>Form Factor</b>	3.5" SFF
<b>Capacity</b>	6TB – 5TB – 4TB – 2TB
<b>Rotational Speed</b>	7200
<b>SAS Interface</b>	12Gb
<b>Cache (MB)</b>	128
<b>Format Options</b>	4Kn – 512e



# HGST Ultrastar® He<sup>10</sup>

## Helium Platform Enterprise HDD

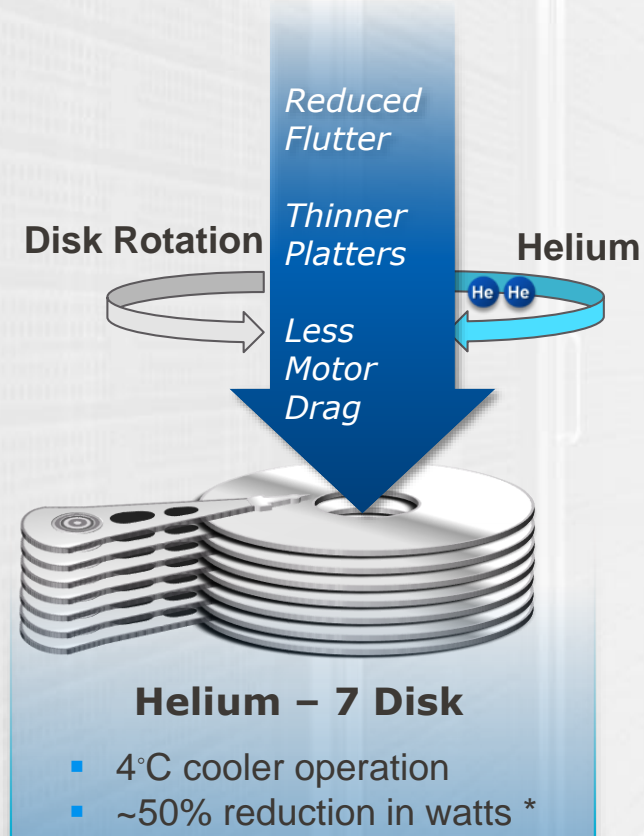


- **World's top capacity PMR drive**
  - 25% more capacity, with 24% less W/TB\* than He<sup>8</sup>
- **HelioSeal® technology**
  - Zero compromises in performance and reliability
- **New technology and features**
  - Non-volatile Media Cache
  - 2nd generation Dual Stage Actuator for more precise head positioning (increases performance)

	<b>He<sup>10</sup></b>
<b>Form Factor</b>	<b>3.5" LFF</b>
<b>Capacity</b>	<b>10TB – 8TB</b>
<b>Rotational Speed</b>	<b>7200</b>
<b>SAS Interface</b>	<b>12 Gbps</b>
<b>Cache (MB)</b>	<b>256</b>
<b>Format Options</b>	<b>4kn – 512e</b>

\* 4kB random R/W, Qd=1

# HelioSeal® HDDs: Two Years Later



\* Per TB

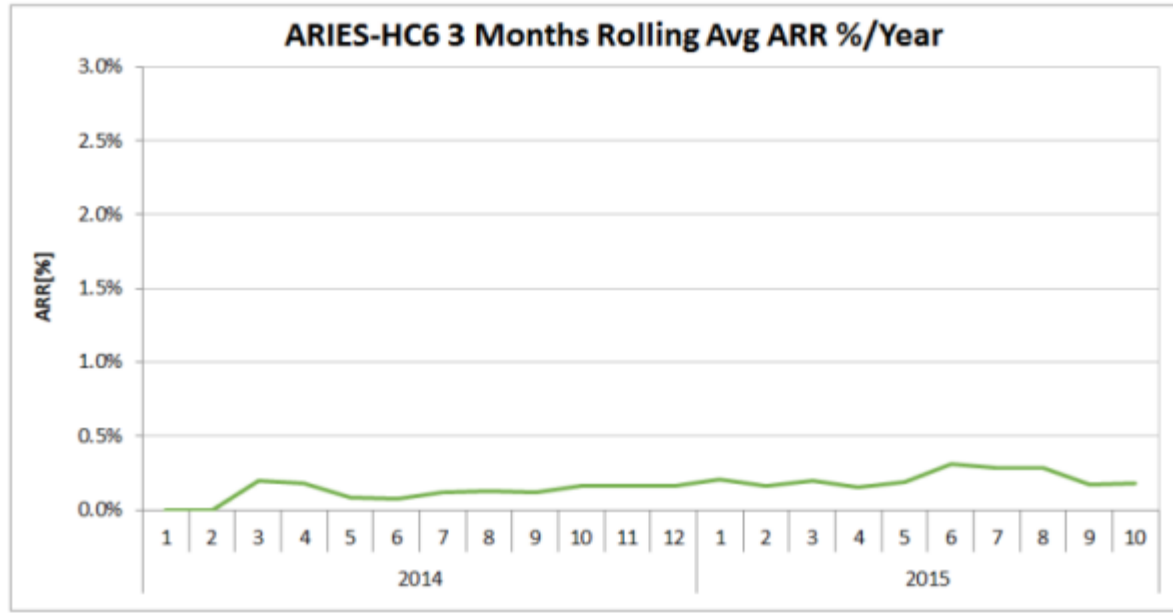
- >5 million helium HDDs deployed
  - 1<sup>st</sup> gen He<sup>6</sup> shipping in volume
  - 2<sup>nd</sup> gen He<sup>8</sup> in mass adoption
  - 3<sup>rd</sup> generation shipping in April
- Mass market acceptance
  - Deployed in world's largest data centers
  - TCO benefits proven
  - Demonstrated reliability  
NEW! 2.5M hrs MTBF rating\*\*
- Demand continues to scale

\*\* 2.5M hours to be demonstrated through ALORT after LVM

# Quality Metrics

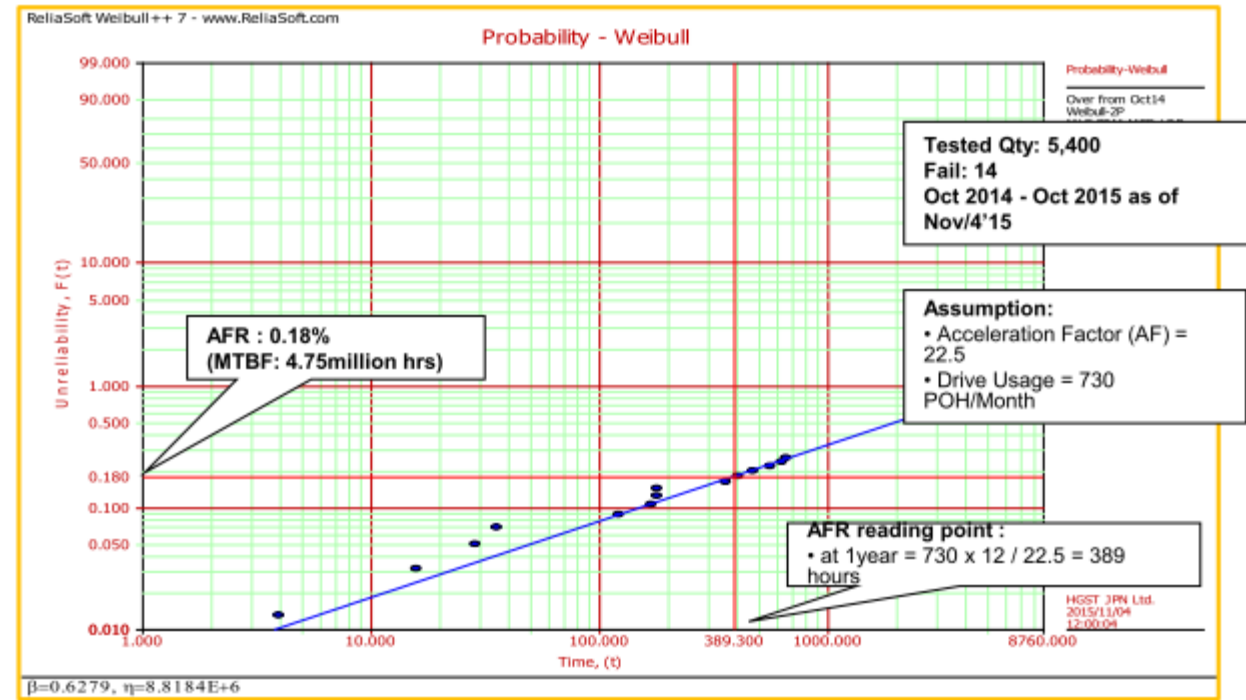
## 2.5M hr MTBF Target Based on Helium He<sup>6</sup> & He<sup>8</sup> Success

All Customers ARR trend: 0.18% in October 2015



	2014												2015											
ARR	0.00%	0.00%	0.20%	0.18%	0.09%	0.07%	0.11%	0.13%	0.12%	0.16%	0.16%	0.16%	0.21%	0.17%	0.28%	0.15%	0.19%	0.31%	0.29%	0.28%	0.17%	0.18%		

He8 AFR estimation by ALORT:  
0.18% = 4.75 million hrs. as of October 2015



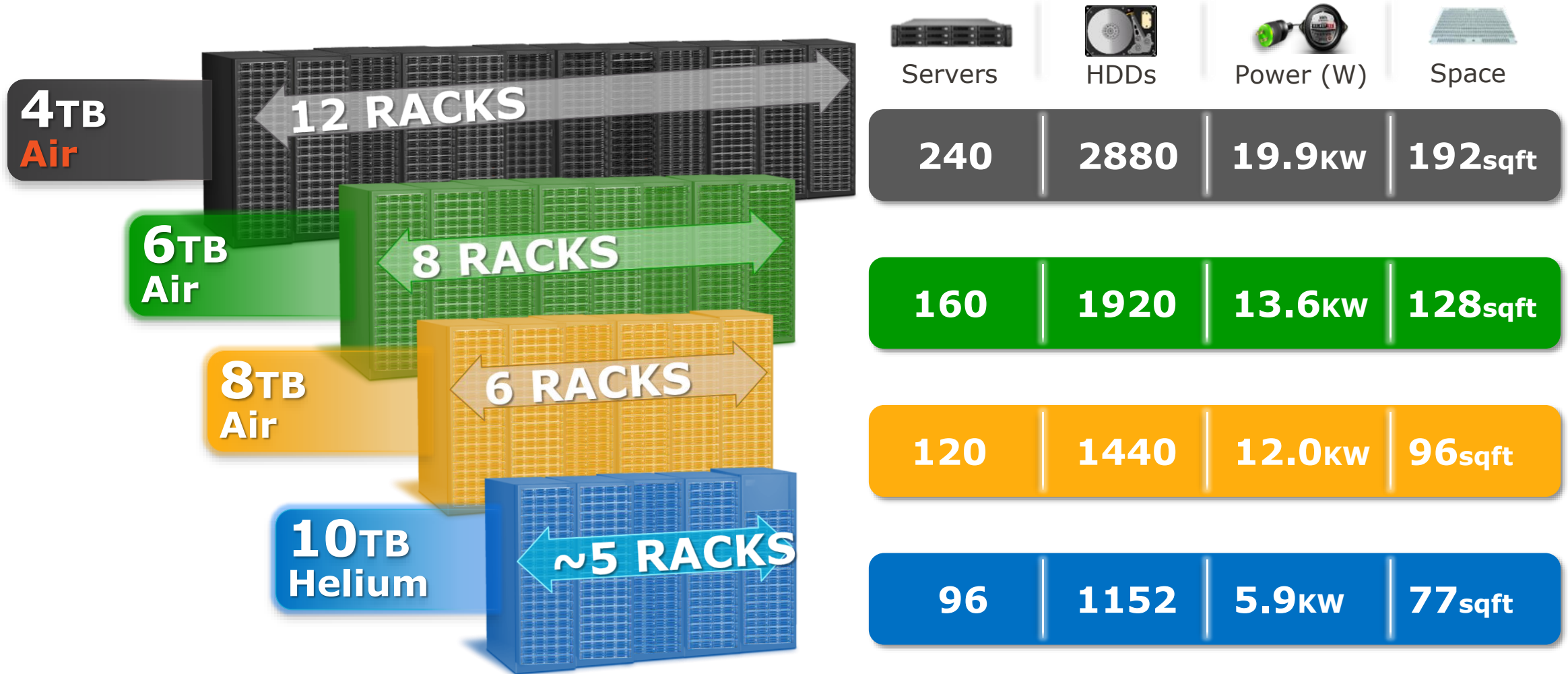
# Product Density & TCO





# Helium HDD: Being Density Advantaged

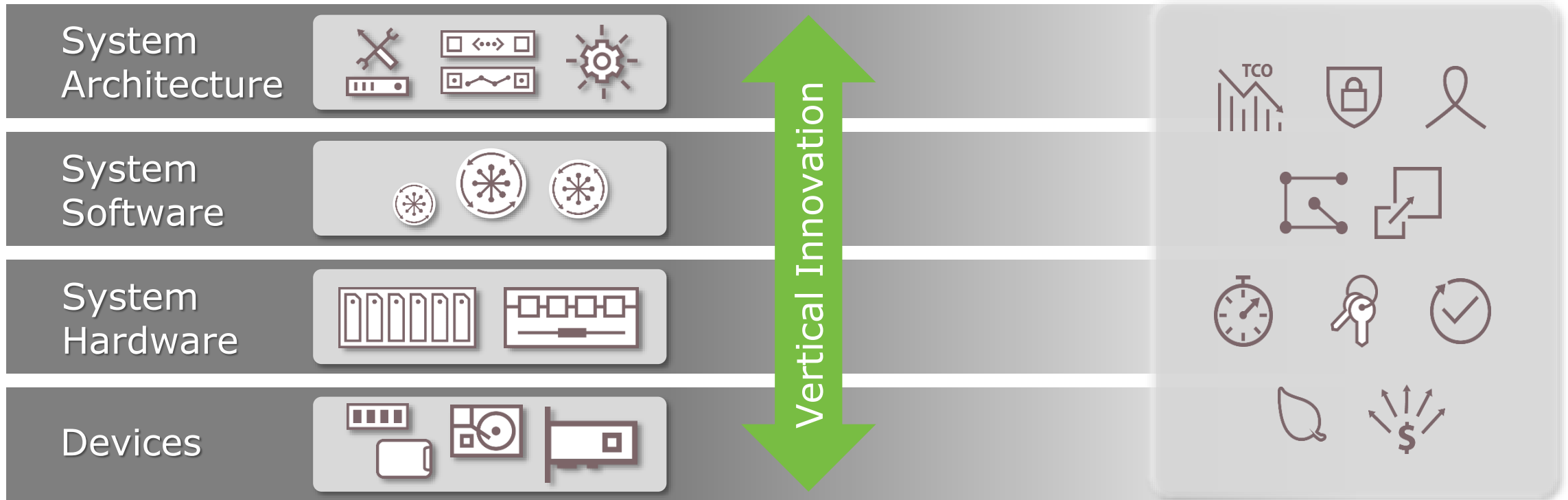
## Deploying 11PB



# 4U60 JBOD Platform



# Building On Our Strengths And Expertise



**Vertical Innovation Enables Breakthrough Value and Capabilities**



# 4U60 Storage Enclosure

Designed for High-Availability Storage Applications

## JBOD Features

- 4 Rack Units
- 12Gb/sec SAS3 interconnect
- 60 Ultrastar HDD Modules



Available in  
**480TB**  
**360TB**  
**240TB**  
capacities

Smaller capacities  
available from  
mid of Q2'16 ...  
starting from 24  
drives, and  
possibility to mix  
with SSD



# HGST Active Archive System

## Simplicity At Scale™



Affordability

Accessibility

Scalability

Simplicity

# Scaling out to Exabytes of Capacity

## HGST Active Archive System

**5.8PB**  
per rack\*

Optimized for  
active archive  
workloads

Breakthrough  
TCO

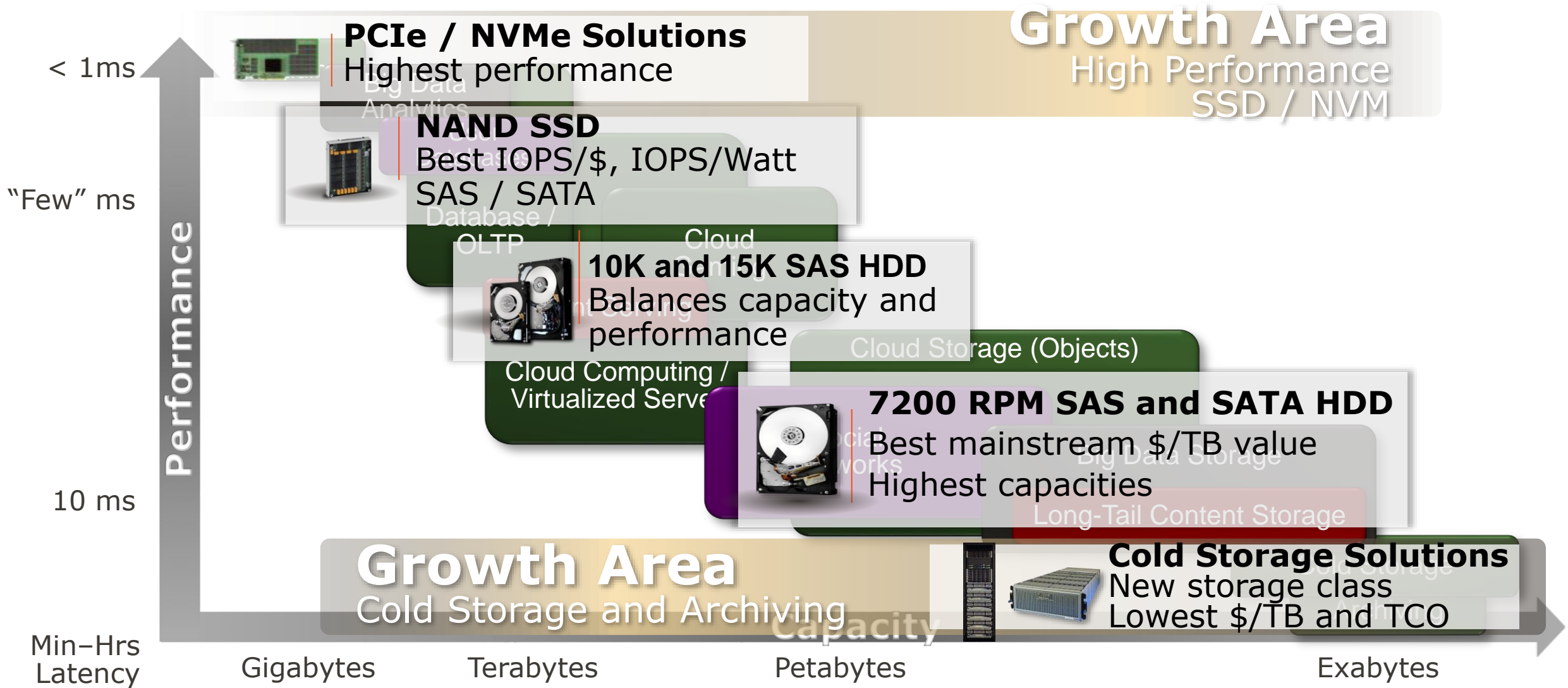
**Highest  
Density**

**Lowest Power  
Utilization/TB**

**Fast Data  
Access**



\* RAW Capacity







# Why HGST?

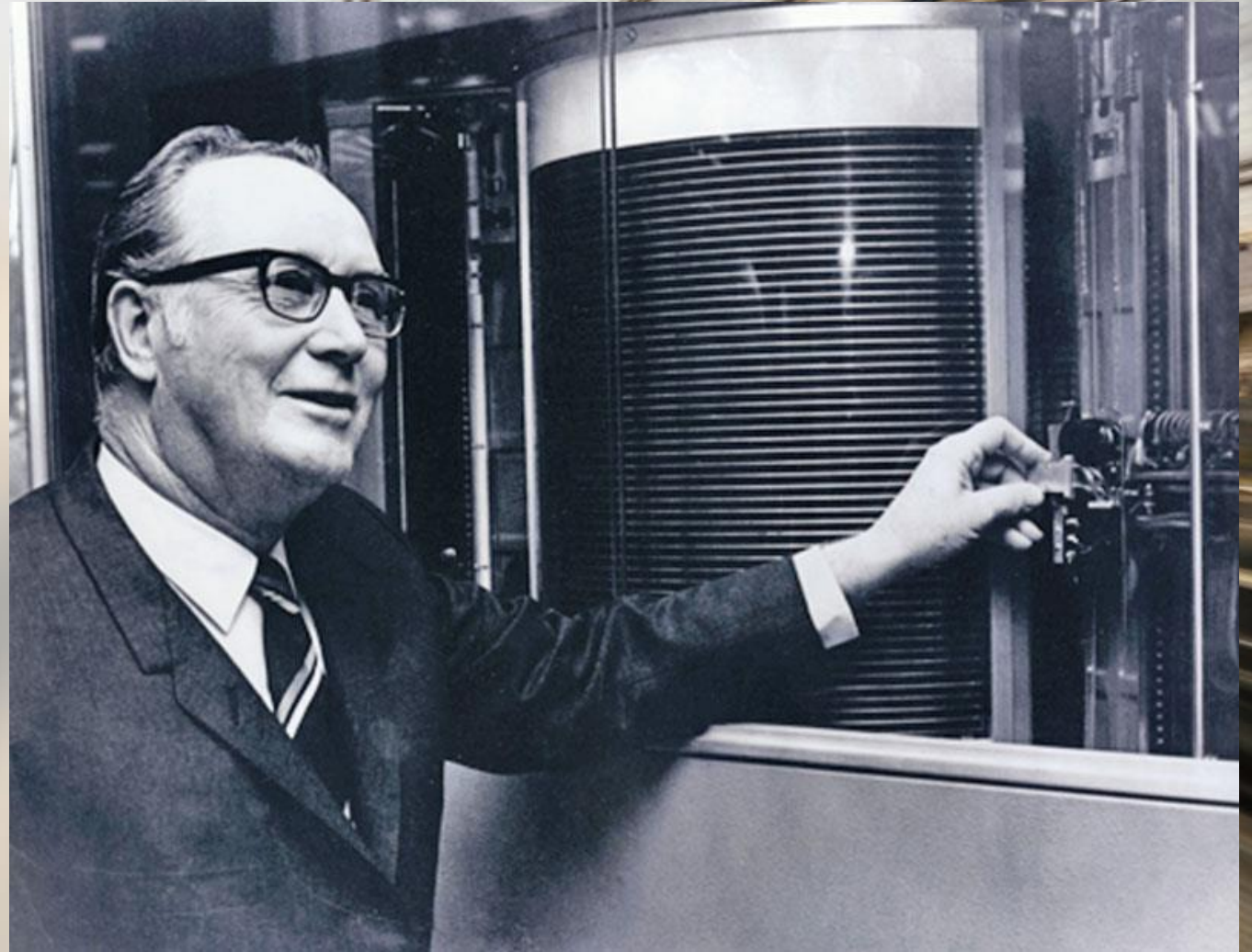




HGST has a direct line of expertise going back to the first hard drives

60 years of  
enterprise  
HDD  
experience

IBM's Rey Johnson in front of a RAMAC  
350 Disk File in 1956





# HGST at the heart of CERN



3D view photo of the LHC  
Machine © 2012 CERN

“As one of the largest hard disk manufacturers for enterprise, HGST plays an important role in providing CERN with reliable disk storage media for bulk storage of scientific data.”

*Olof Barring*

*Head of facility, planning and procurement*



