The Future of Tape
(Far from Dead)

Media Trends Panel
MSST 2016

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Data Growth and Storage Requirements

35,000 Exabytes in 2020

Information is growing at 50% a year *

80% of data is never used after 90 days

Cost to power and manage storage is increasing

800 Exabytes in 2009

Source: IDC Digital Universe Study, sponsored by EMC

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Advantages Continue to Propel Investment in Tape

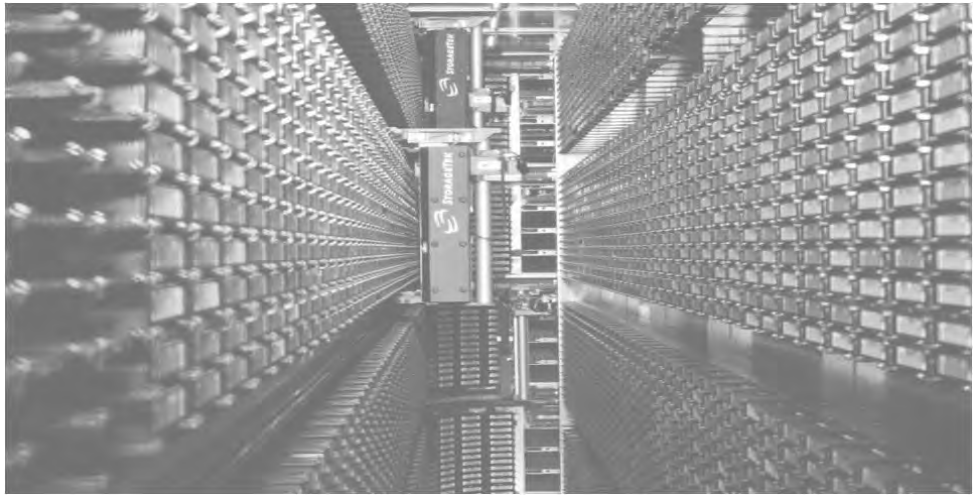
Lowest cost per TB

Lowest data security risk

Lowest energy use

Lowest migration frequency

Tape Usage Trends



Archive/Cold Storage

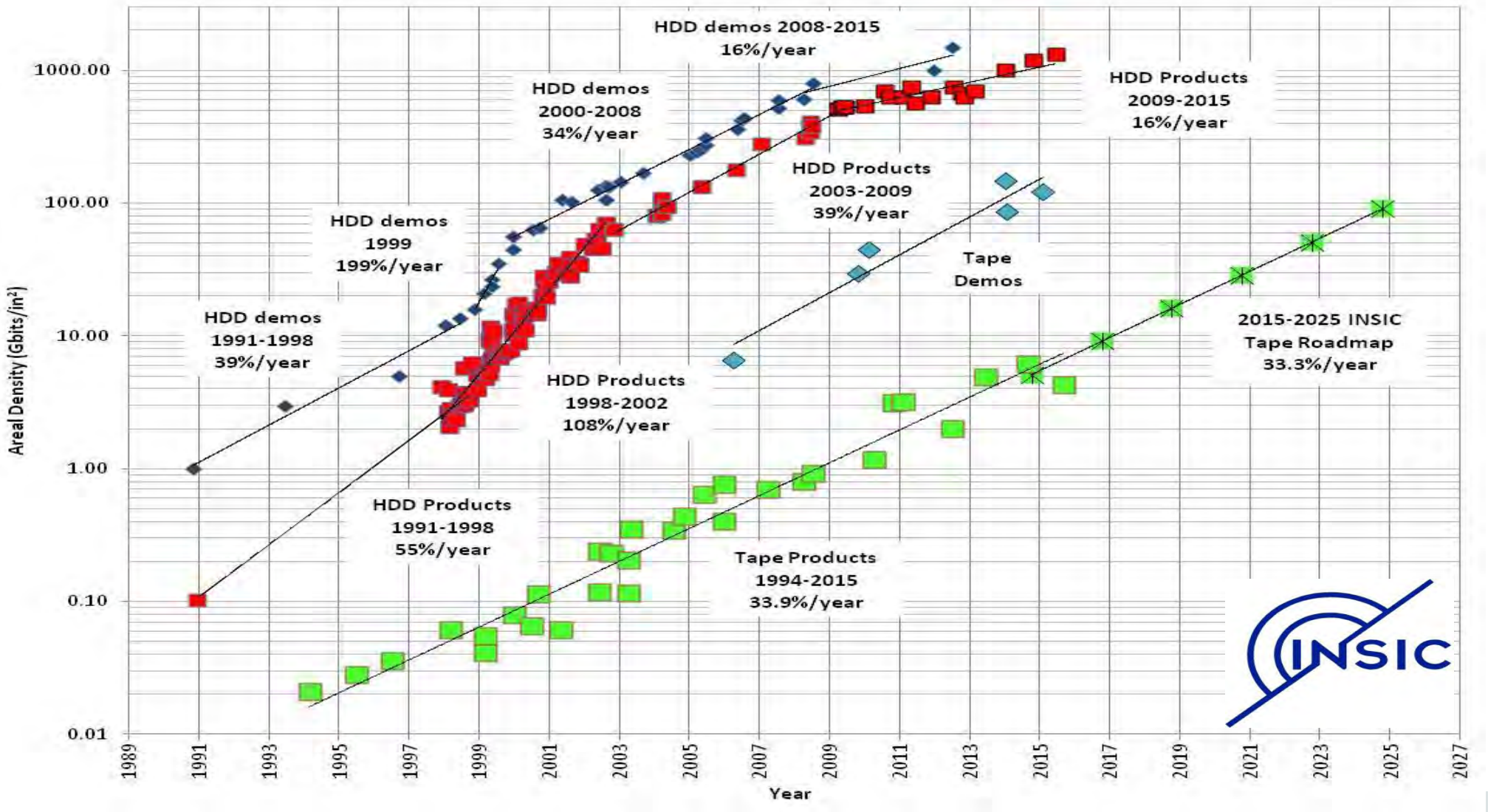
- High capacity storage (PBs)
- Data accessed infrequently
- Data reads do not require high availability
- Low cost

Cloud Storage

- Seeing higher adoption rate with cloud providers
- Low cost, archive tier
- 2nd or 3rd copy off premise

Areal Density Trends

Chart provided courtesy of the Information Storage Industry Consortium (INSIC)



INSIC Shows Technology Path to 248 TB per Cartridge

Media Vendors Demonstrate Technology Needed to Achieve Roadmap Goals

SONY

Sputtered Media demo

Proof of Manufacturing concept

Areal Density: 148 Gb/in^2

Cartridge Capacity: “185 TB”

FUJIFILM

Advanced BaFe demo

Areal Density: 123 Gb/in^2

Cartridge Capacity: “220 TB”

http://www.sony.net/SonyInfo/News/Press/201404/14-044E/

http://www.fujifilm.com/news/n150409_03.html

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2015 – 2025 INSIC Roadmap Summary

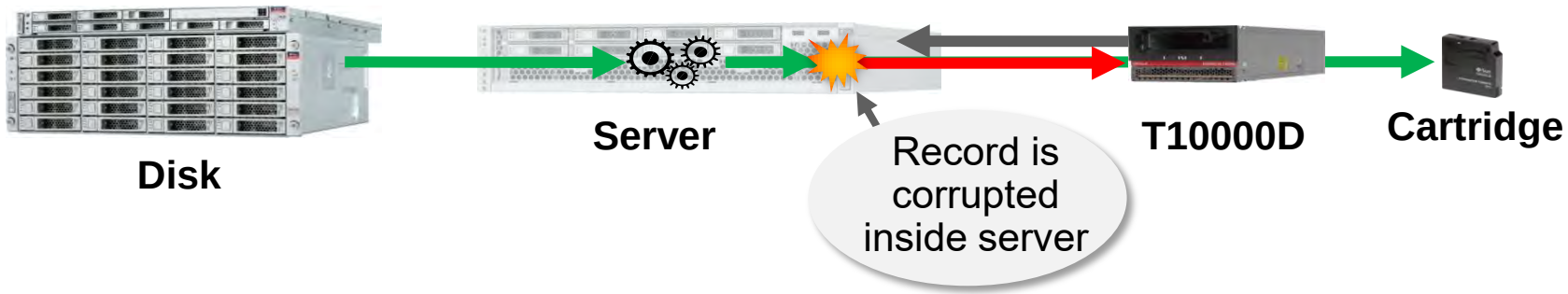
- Tape will maintain its high areal density growth rate
  - Evolution, not invention
  - No fundamental issues, just scaling
- High confidence in ability to meet roadmap goals
  - Use knowledge from previous HDD development
  - Recent tape technology demos
- Tape in unique position to pursue 2 different media technologies to achieve high capacity cartridge

Continued Innovation in Enterprise Tape Drive Features

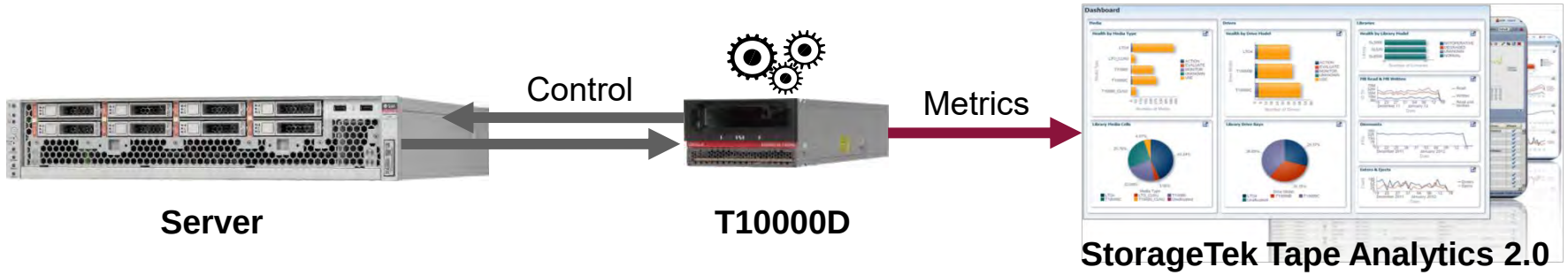
- Data Integrity
- Improved Read Access
- Media Migration

Data Integrity Features

Data Integrity Validation - Discover corrupted records before they are written to tape



In-Drive Media Validation – Saves network bandwidth and server resources



Read Access Ordering

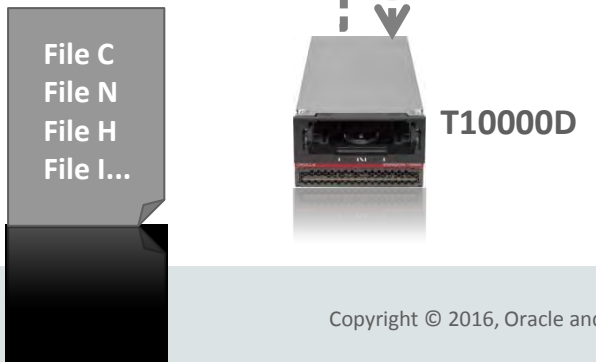
StorageTek File Access Accelerator

T10000D

Step 1: Generate Read Access Order (GRAO)*

Step 2: Request Read Access Order (RRAO)*

Step 3: Send Reordered File List



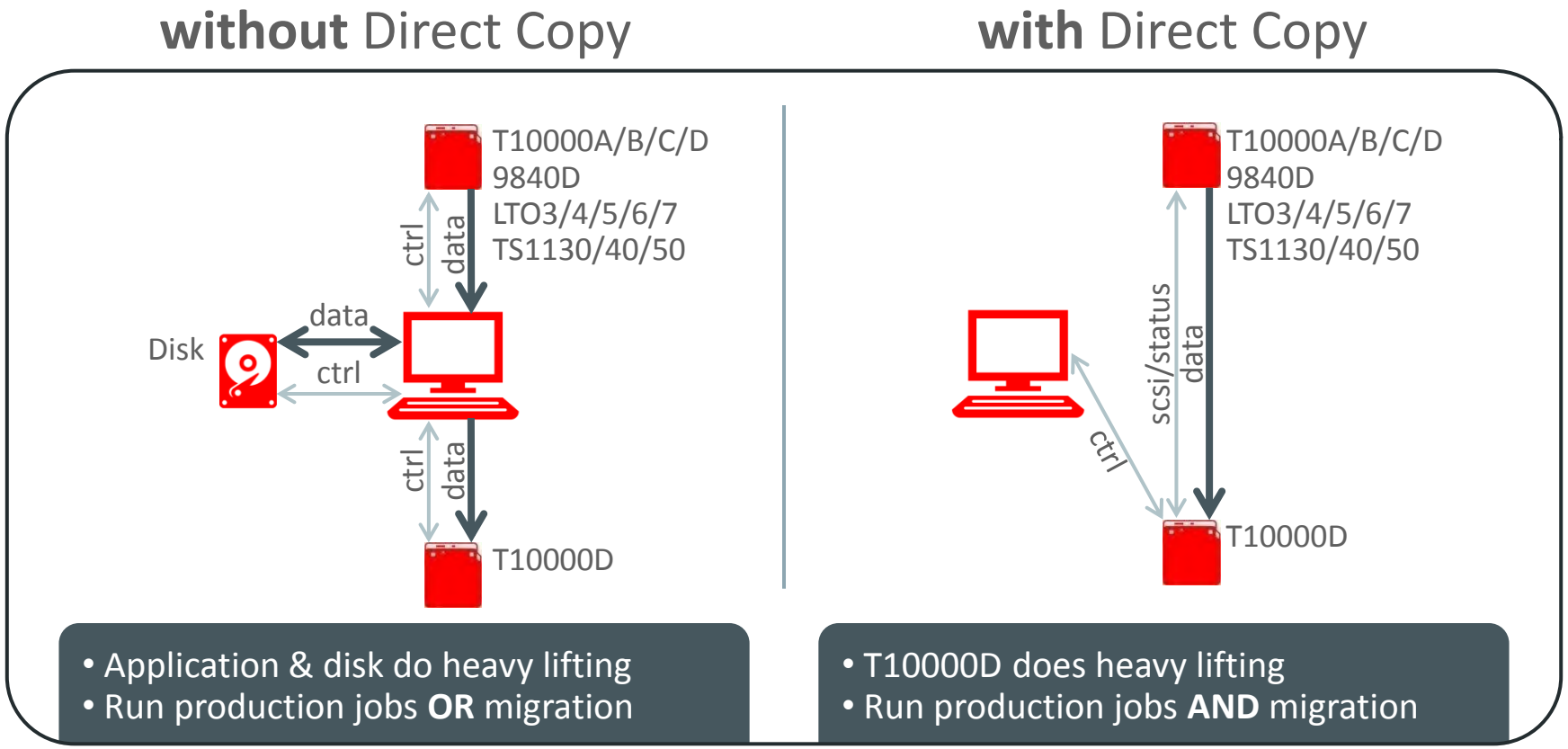
T10000D

30-60% faster access!

*Supports T10 ANSI Standard 13-266r4

Easing the pain of Media Migration

Drive-to-Drive Copy



Tape Technology Summary

Tape is the ideal archive media

- Tape will remain the most efficient, cost effective, and reliable technology for long term data storage
- Tape will continue to have the highest areal density/capacity growth rate
  - Evolution, not invention
  - No fundamental issues, just scaling
- Growing consensus that 1 technology will not ‘win’
  - Storage solutions will feature combo of flash, disk, and tape
  - HDD will not completely replace Tape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