SPECTRA SINCE 1979

T~Finity

at Pawsey

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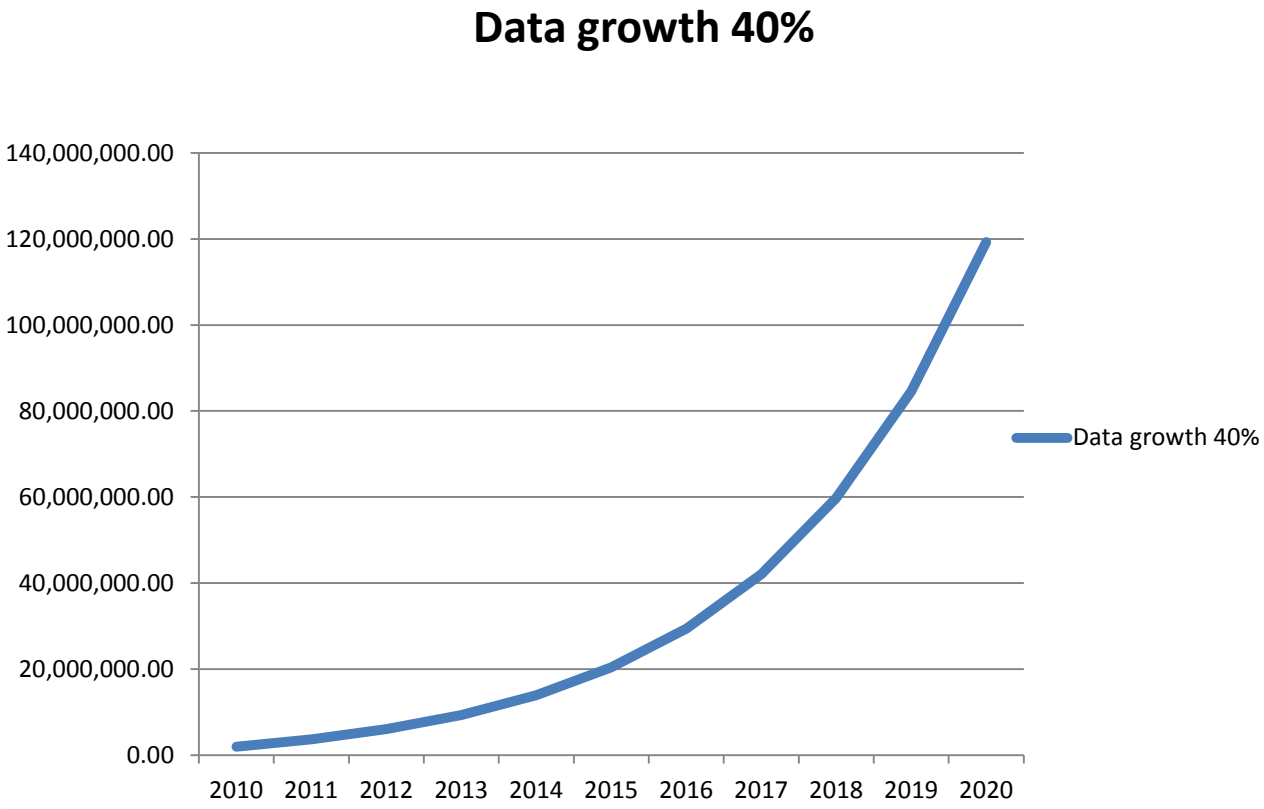
iVEC CSIRO

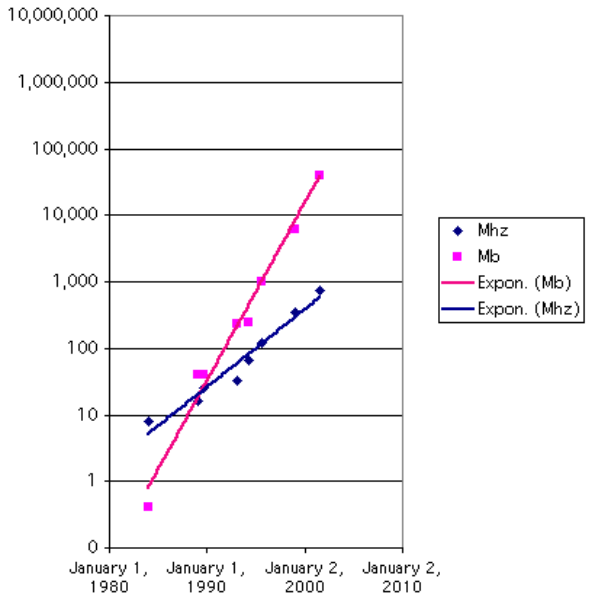
sgi

Agenda

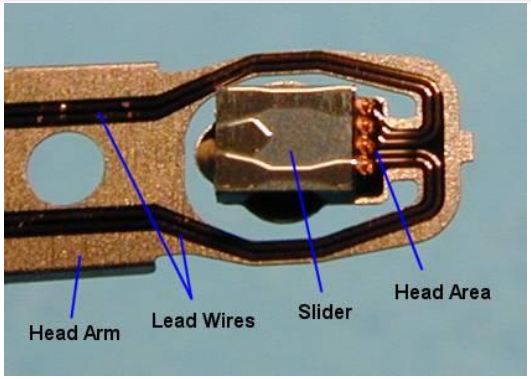
- Industry trends in secondary storage (some tape)
- Disk and tape head technology – same thing really!!
- It's just tape surely ?
- Where's it all heading - current and future technologies (removed)
- Over to Mike
- Technology in the Spectra libraries (installed at Pawsey and others)
- Installation at Pawsey
- Future directions.. (removed)
- Q and A

Kryders Law ?


Data growth 40%
140,000,000.00
120,000,000.00
100,000,000.00
80,000,000.00
60,000,000.00
40,000,000.00
20,000,000.00
0.00
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
Data growth 40%


10,000,000
1,000,000
100,000
10,000
1,000
100
10
1
0
January 1, 1980
January 1, 1990
January 2, 2000
January 2, 2010
Mhz
Mb
Expon. (Mb)
Expon. (Mhz)

Tape leverages disk technology



- Disk Drive Head Technology
  - GMR disk drives were release in 1993
  - Disk drive heads are now TMR
  - CMR, Hammer, Pattern – new technologies
- Tape Drive Head
  - Introduced GMR in 2008
  - Tape is 2 generations behind d
- Recording area
- Shingles !
- Beveled heads (air gap)

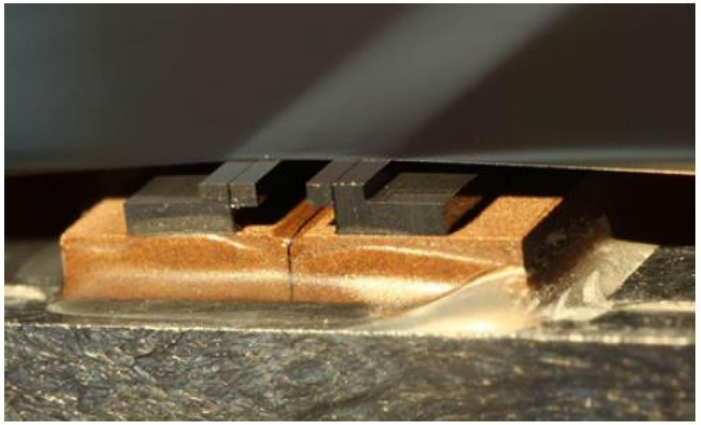


Figure 8: A 2-Module LTO Head Showing Tape Wrap Source: IBM

Figure 7: Plane View of LTO Chip Image Showing 16 Data Tracks, 2 Servo Readers and Connection Pads (at top) [5]

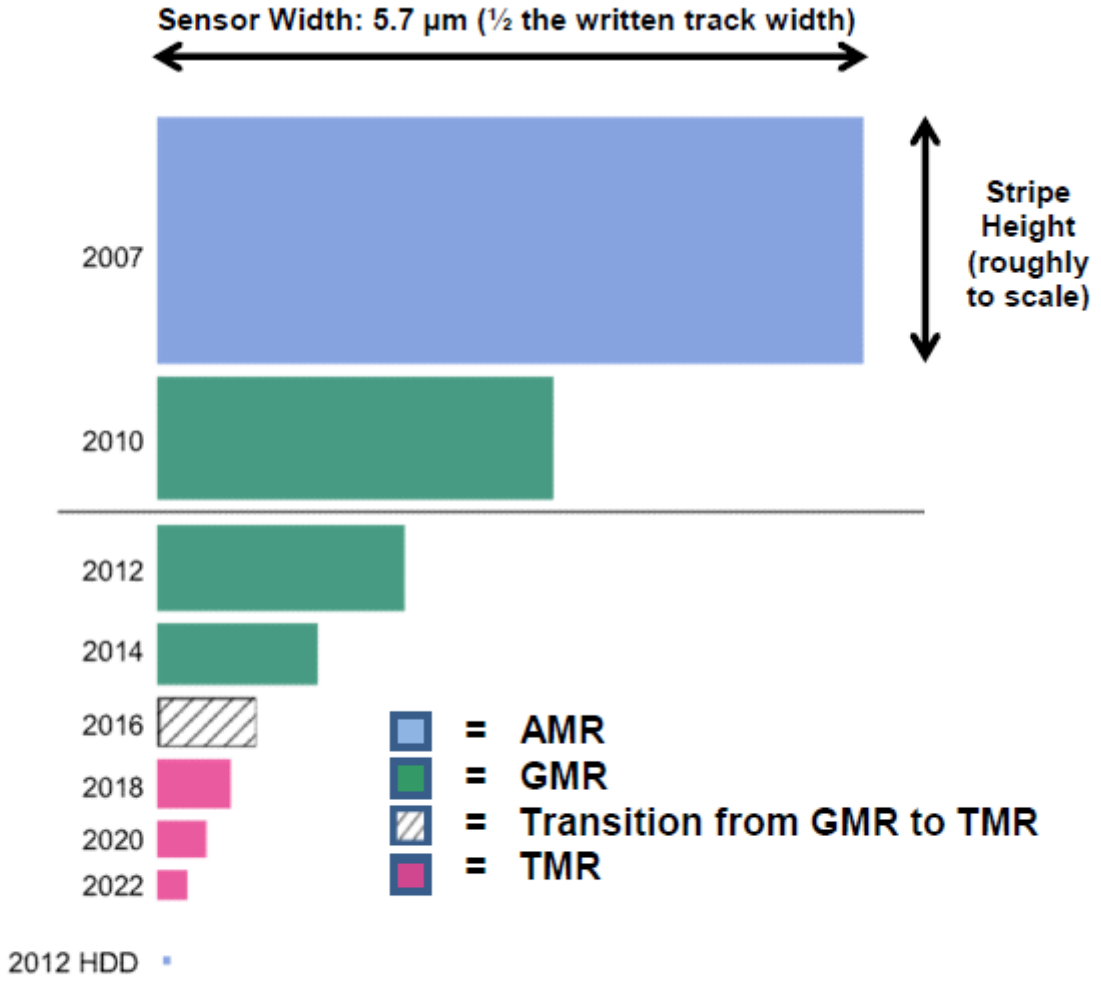
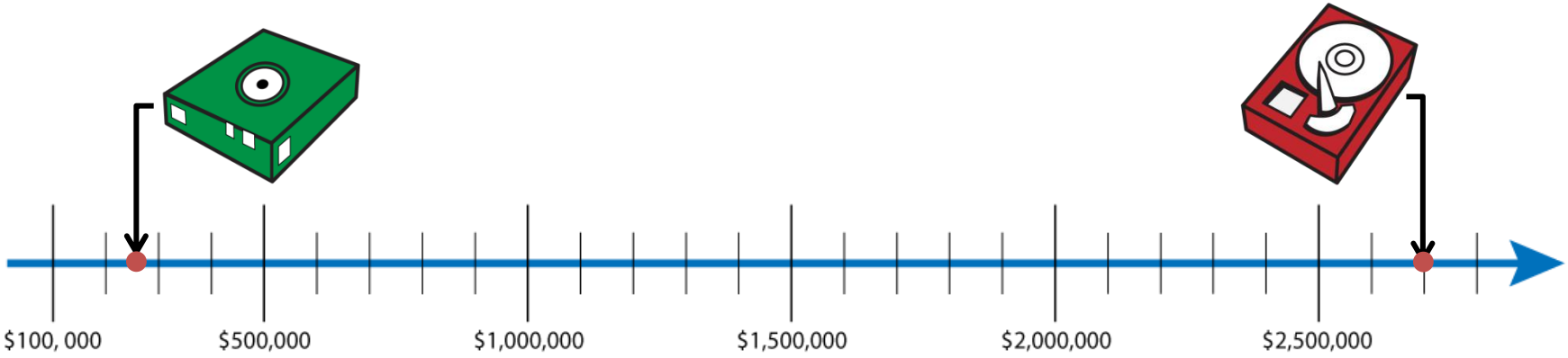


Figure 3: Tape Head Read Sensor Width Scaling over Time and Comparison to Current HDD TMR Sensor Dimensions (at approximately 50 nm x 50 nm, shown at the bottom of the figure). [See also Figure 9 in Section 2.4.9 for the 2012-2022 read sensor width dimensions]

Tape Has Lowest Acquisition Costs

- 10 to 15 times less expensive than disk
  - 2.7PB tape system has street price of $0.07 to $0.10 per GB. Larger systems are even lower.
  - IT grade has street price of ~ $1.00 GB; enterprise class disk is more expensive.

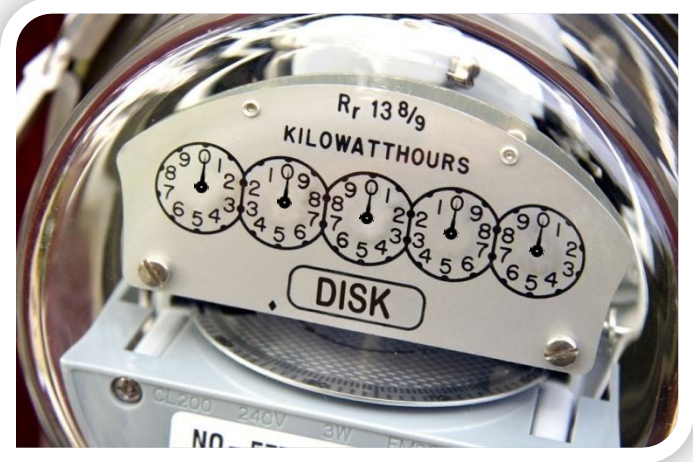


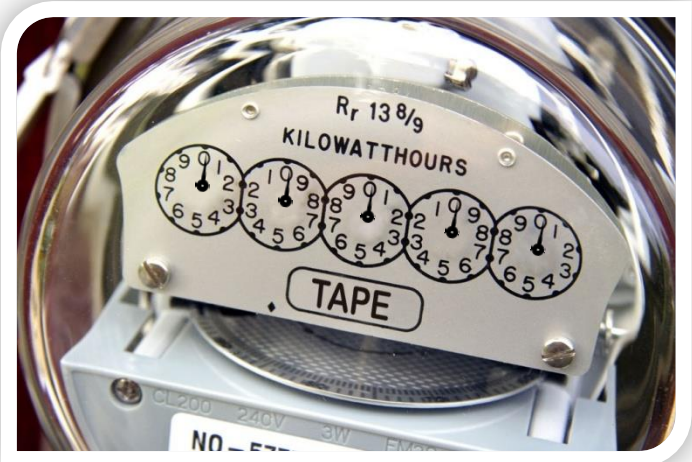
Tape Has Lowest Operating Costs

Operating costs are low and predictable

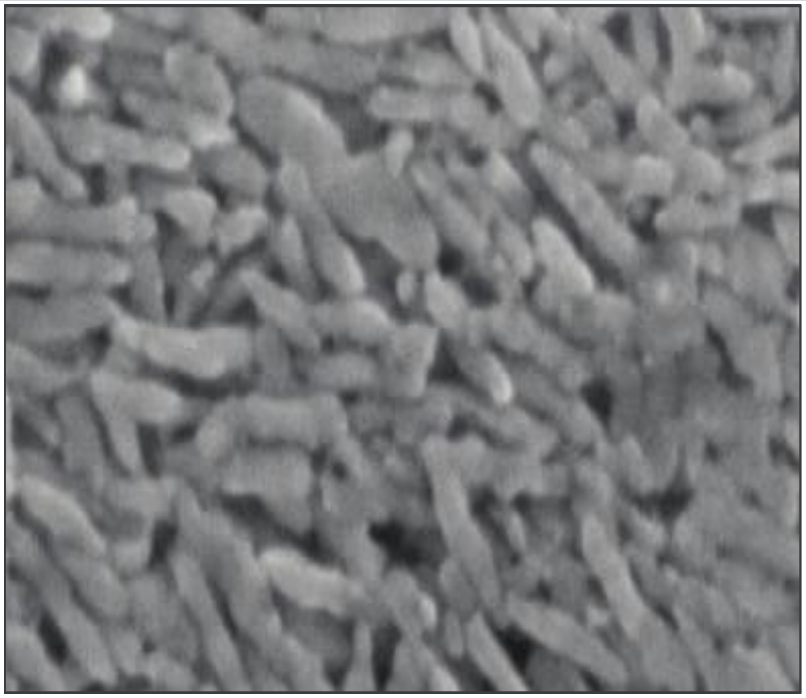
- Lower purchase means lower ongoing support costs
- Tape's power consumption is roughly 4% disks

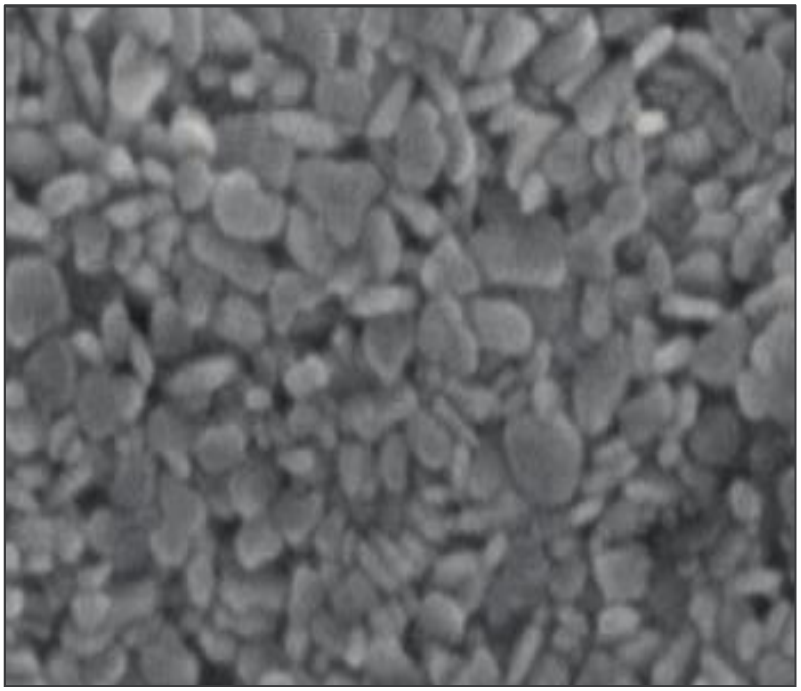
Source: Clipper Group Study, "Tape Remains King", based on an initial 30 terabytes of data





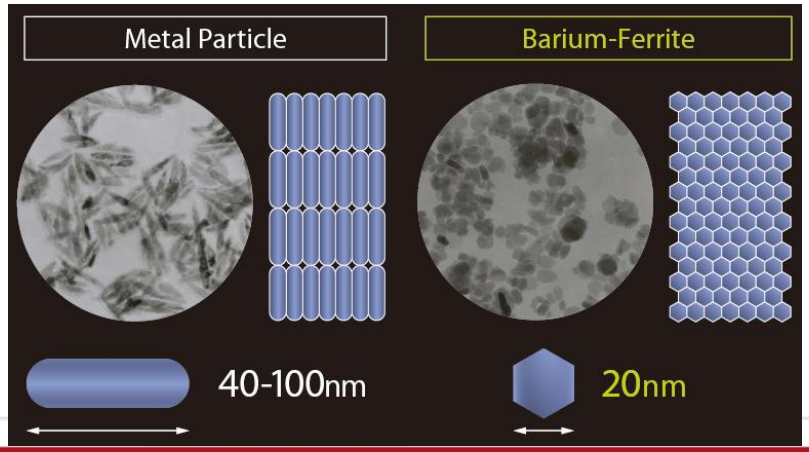
Magnetic Particles under SEM



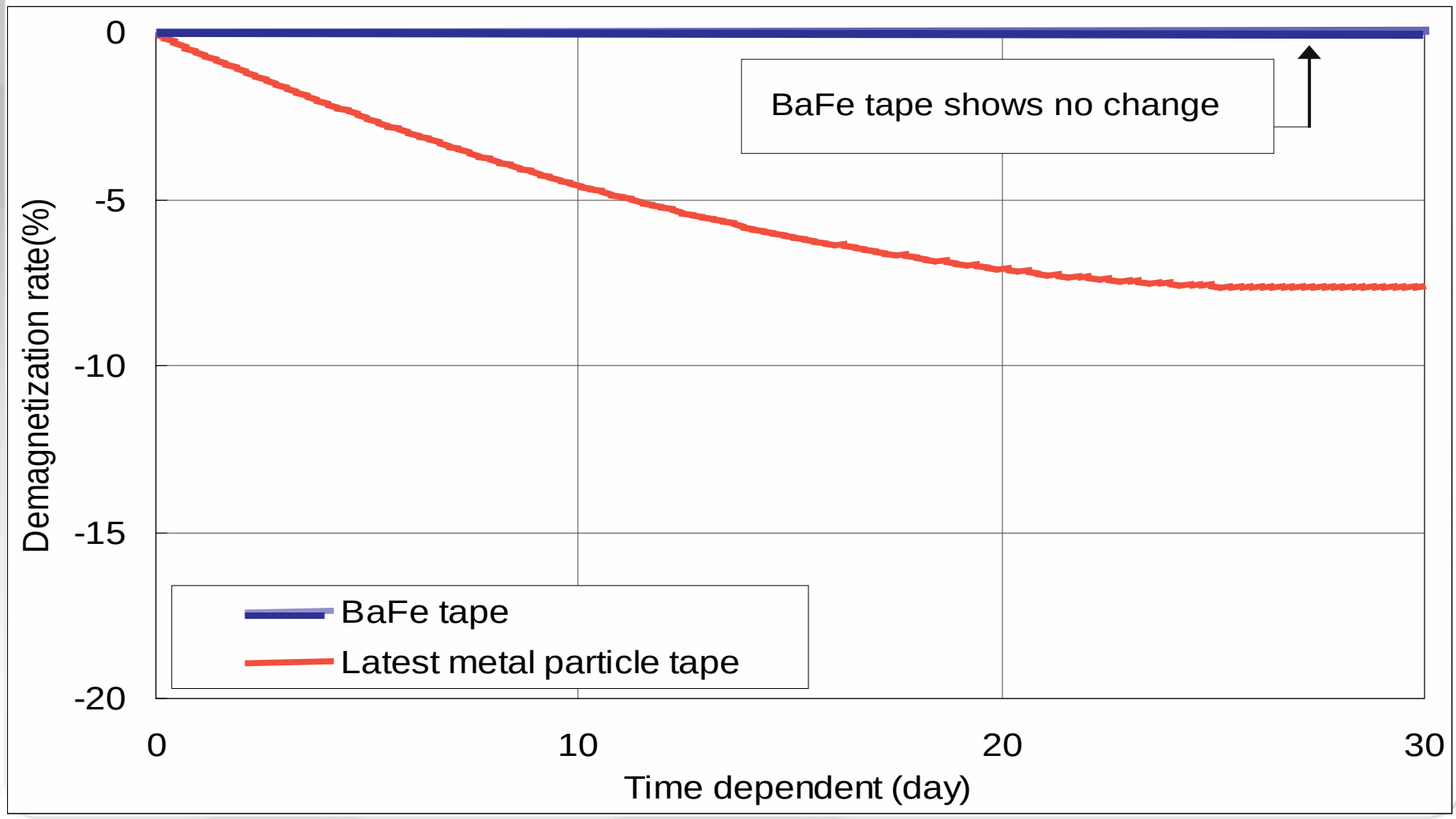


Spectra Certified Media

- Two Formulations
  - Metal Particle (MP)
  - Barium Ferrite (BaFe) – Enterprise media.
- LTO-6 drive designed and tested for both media formulations
- A mixture of the two formulations can be used in any Spectra T-series library
- Both MP and BaFe offer the same great Certified Media benefits



Loss of magnetism over time

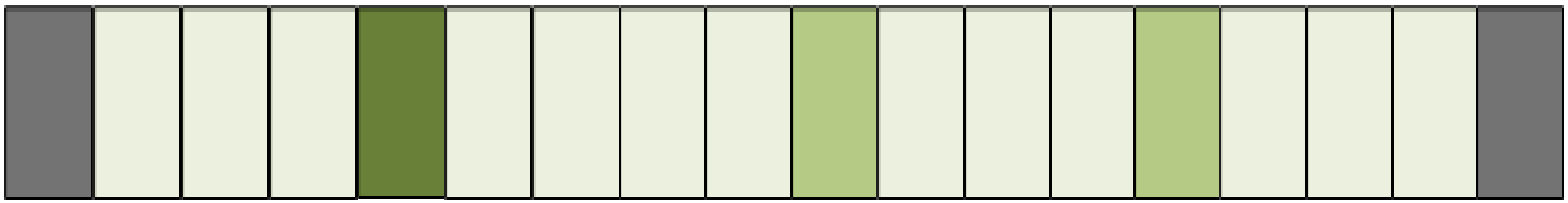


T200 and above - BlueScale Vision Camera

- Internal library web camera
- Monitor moves, mounts, and transport operations
- Ideal for lights out, remote library operations
- Visual diagnosis without removing library panels

T-Finity Flexible Configuration

- World's largest library
- Supports nearly any combination of frames
- Each robot has access to every tape and every drive.



18 Frames Shown Here
Master, Drive Exp. & Media Exp. Frames may be located anywhere within the configuration.

Master Frame Drive Expansion Media Expansion Service Frame

Bluesscale 12 Software Updates

- General Status without logon
- NTP support
- Increased RLC connections to 8
- Browser Cache enabled
- Web Server Certificate support
- Upload moves via CSV file
- XML Interface
- Improved library startup time
- Faster BlueScale upgrades
- DCM firmware broadcast
- Operational robotics health test
- SQLite
- Improved barcode scan performance
- Continuous QIP / RIM logging
- Unload all drives to original source utility
- Conditionally send OS to RCM
- Track barcodes in drives on reboot
- Optimize Terapack import placement
- Robot utilization improvements

Bluescale 12 Software Enhancements

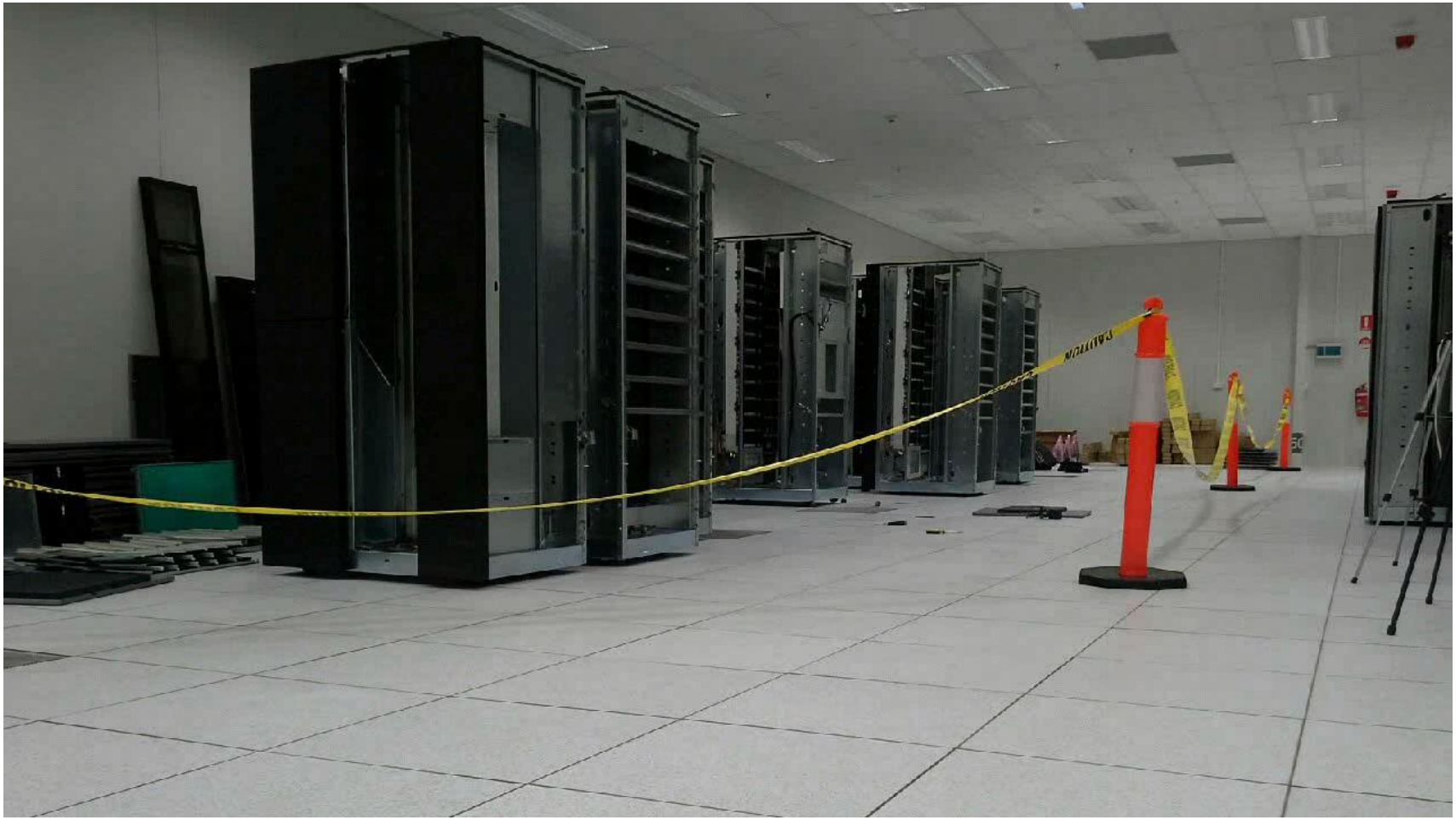
- Bulk TAP support
- LTO6 support
- Spectra TKLM
- Internal Ethernet network support
- Reporting mixed LTO generations in single partition
- Auto-reboot from power loss
- Moving Holes
- Service bay improvements (efficient robot moves in / out)
- Pre-staged Drive Firmware
- Bug fixes

Bulk TAP

EtherLib – T950 and T-Finity

- Internal Ethernet Network (EtherLib)
- Ethernet backplane
- Integrated Ethernet switch
- Integrated Ethernet cabling

- Increased Performance
- Firmware uploads across frames and drives
- Up to 10x improvement in upgrade time
- Faster inventory retrieval
- Faster traces to speed logging and diagnostics
- High volume traffic transmitted over Ethernet
- Allows CAN to become redundant communications path


CAUTION

Thank You – Any Questions?