



# DMF-UG 2017

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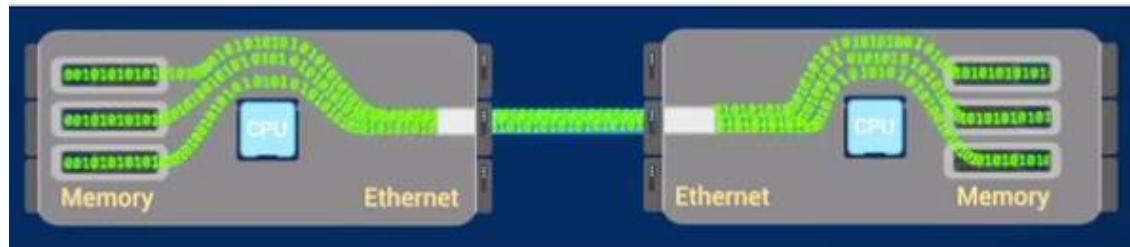
**DEEP STORAGE EXPERTS**

# State of the Tape Storage Industry

- Technology Roadmap
  - RoCE interface
  - Head design update
  - Track v Linear Density
  - Investments required to meet the coming challenges
  - Some important changes to the supply chain
  - Tape Format roadmap
- Spectra Product Roadmap
  - Performance Improvements
  - Power Improvements
  - Increased flexibility

# State of the Tape Storage Industry - Technology

## Ethernet Connected Drives



- RoCE (RDMA over Converged Ethernet).
- Lower Cost infrastructure.
- Common Infrastructure.
- Higher Bandwidth
- Flexible Data Path and Management.

- Future drives will release with RoCE. Release date to be determined

# Tape Drives and Head Development

- **Current Tape Drive Technology Based on GMR.**
  - LTO7, T10000D, TS1150, T10000E (HDD's stopped using GMR in 2004)
- **GMR has reached its density limits.**
- **TMR provides a 4x improvement in signal sensitivity.**  
**Less susceptible to noise and media discrepancies.**
- **TMR Heads run cooler than GMR.**
  - Benefits media and data integrity.
- **IBM TS1155 and LTO-8 will be based on TMR**
- **Tape has 13 yrs of TMR development to leverage**

# Capital Investment – The reality

- **TMR Requires Major Manufacturing Re-Investment**
  - \*\$10-15 million in capital retooling per fab (estimated)
    - Canon Anelva vacuum deposition system cost \$7-8 million alone.
  - \*\$10-13M yearly production run rate cost (estimated)
- **TMR Requires Major Re-Engineering**
  - Head characteristics are substantially different than GMR
  - IBM has had to pioneer new tech to make it work.
  - It took IBM 8+ years to make it work in partnership with Hitachi/WD whom had experience with the technology.
  - It will be the same for any manufacturer who make tape drives



\* Note “industry analyst predictions”

# Supply Chain update

Drive Head  
Manufacturers

**ORACLE**



123,000  
Heads Per Year

**TBM**



108,000  
Heads Per Year

Tape Drive  
Manufacturers

**ORACLE**



**IBM**

Drive Heads  
3,000 Per Year

Drive Heads  
120,000 Per Year

Drive Heads  
108,000 Per Year

Oracle® T10K Drives  
3,000 Per Year

HP LTO Drives  
120,000 Per Year

IBM LTO Drives  
100,000 Per Year

IBM TS Drives  
8,000 Per Year

# Supply Chain update

Drive Head  
Manufacturers

**ORACLE**



2,500  
Heads Per Year

**IBM**



228,000  
Heads Per Year

Tape Drive  
Manufacturers

**ORACLE**



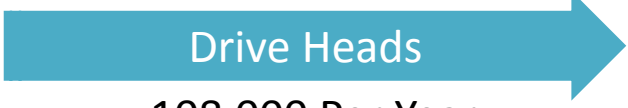
**IBM**



Drive Heads  
2,500 Per Year



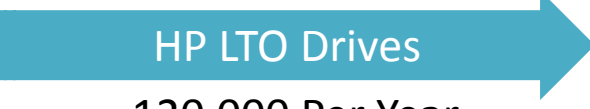
Drive Heads  
120,000 Per Year



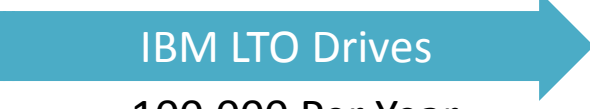
Drive Heads  
108,000 Per Year



Oracle® T10K Drives  
2,500 Per Year



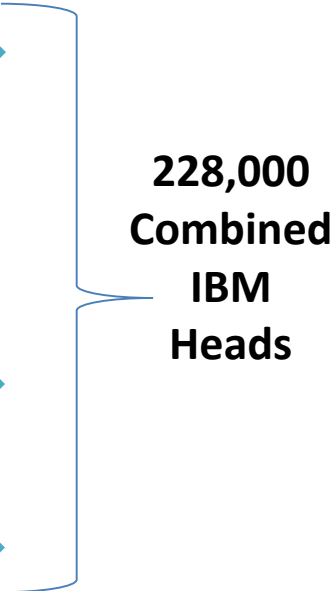
HP LTO Drives  
120,000 Per Year



IBM LTO Drives  
100,000 Per Year




IBM TS Drives  
8,000 Per Year



228,000  
Combined  
IBM  
Heads

# IBM Tape Drive History and Roadmaps


LTO Generations	LTO-6	LTO-7	LTO-8	LTO-9
New Format Capacity (Native) 	2.5 TB (L6)	6 TB (L7)	Up to 12 TB (L8)	Up to 25 TB (L9)
Other Format Capacities (Native)	1.5 TB (L5) (800 GB L4 R/O)	2.5 TB (L6) (1.5 TB L5 R/O)	6 TB (L7) (2.5TB L6 R/O)	Up to 12 TB (L8) (6 TB L7 R/O)
Native Data Rate	160 MB/s	300 MB/s	Up to 472 MB/s	Up to 708 MB/s

2012

2015

2011

2014

TS1100 Generations	TS1140	TS1150	TS1155	TS1160	TS1170
Max Native Capacity (media type) 	4 TB (JC)	10 TB (JD) 7 TB (JC)	15-17 TB (JD) TBD (JC)	18-20 TB (JE) 15-17 TB (JD) 10-12 TB (JC)	30-40 TB (JE) 15-17 TB (JD) 10-12 TB (JC)
Native Data Rate	250 MB/s	360 MB/s	360 MB/s	Up to 500 MB/s	Up to 1000 MB/s
Attachment	FC-8	FC-8	FC-8, 10 GigE (RoCE, iSCSI)	FC-16, 25 GigE (RoCE, iSCSI)	TBD

Drive roadmap reflects continued strong investment

- LTO-7 GA 6TB and 32 channel
- Enterprise to ship 15+TB on existing media
- LTO-8 back on cadence and targeting 12TB

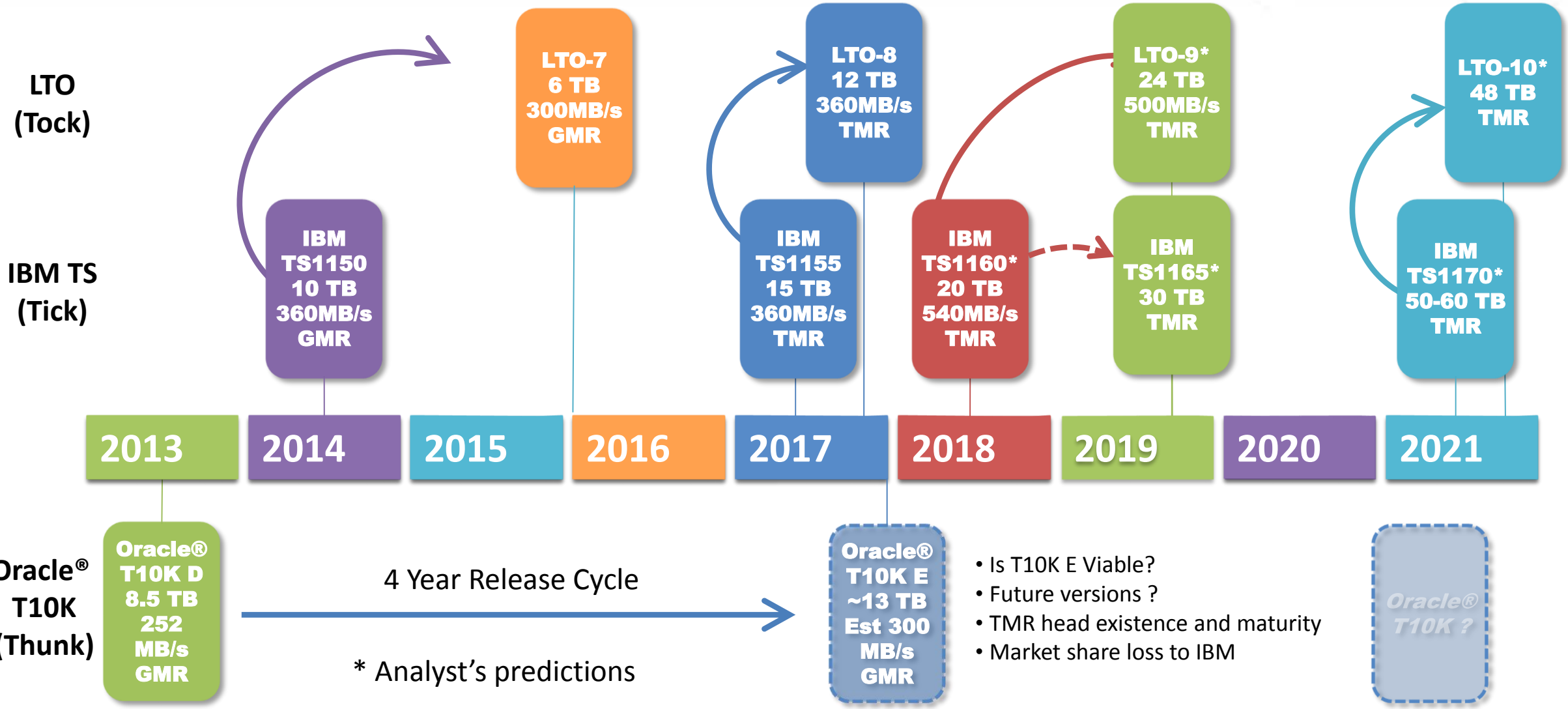


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# State of the Tape Storage Industry - Tape Technology Roadmap

TS11x0 & LTO now on a 2 year cadence



# Conclusions

- **TMR Technology will introduce a step change in density and performance.**
- **Capacity without throughput creates bottlenecks.**
  - TS11x0 technology has increased capacity and throughput for multiple generations.
  - Can the T10K keep up?
- **Oracle lost its drive head business to IBM.**
  - Needs to amortize \$20 - \$30 million factory op-ex and new capital investment over 2,500 heads annually.
  - Oracle currently on a 4 year drive release cycle, IBM on a two year release cycle.
  - Uncertain roadmap beyond T10000D - STILL
- **IBM has been working with TMR for more than 8 years.**
  - Will release the first TMR based drive in 2017
  - TS1155 will use same JD media at a lower price point with up-format
  - IBM's Tick-Tock strategy releases 1 drive a year
- **Everything we hear from various sources**
  - **Oracle will exit the drive business.**
  - **What about Libraries ?**

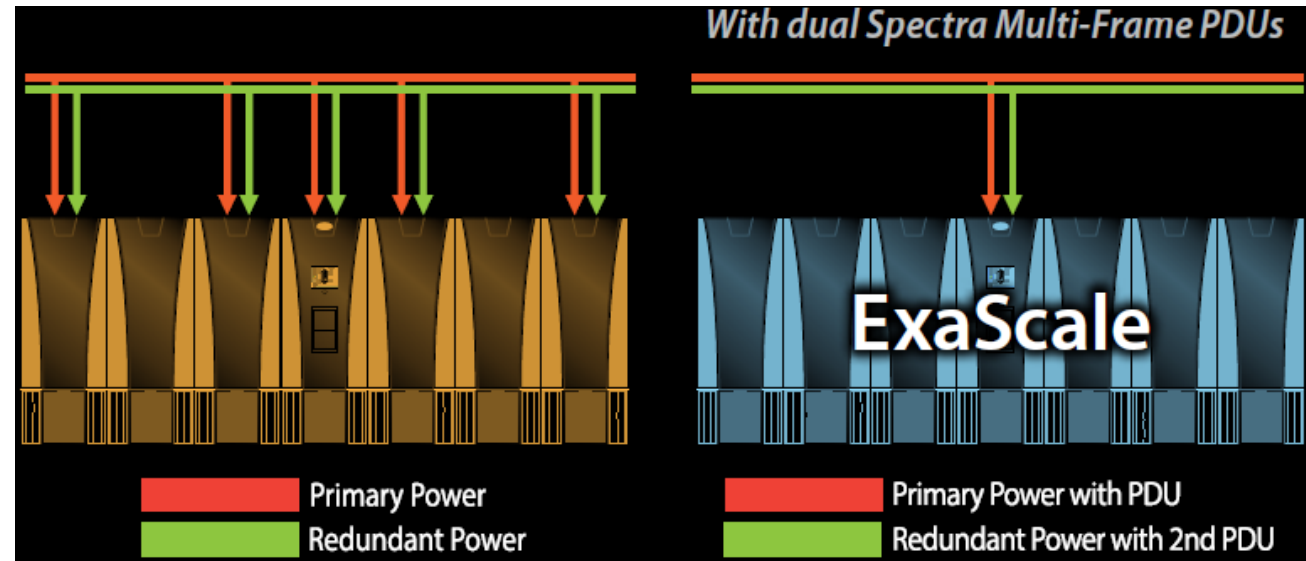


The screenshot shows a forum thread interface. At the top, there are navigation links: "Ads by Google", "Layoffs", "Warn Act Notice", and "Employment Laws". The main title of the thread is "Thread regarding Oracle Corp. layoffs". Below the title is a search bar with the text "Google™ Custom Search" and a "Search" button. The main content of the thread is a post that reads: "200 let go from Tape group in Colorado a few weeks ago. Several in Santa Clara going today". Below the post, it indicates "18 days ago by Anonymous | Post ID: @LqQAdgI" and "2297 views | 4 replies (last 12 days ago)".



# New Dual AC Power and Spectra Multi-Frame PDU

- **New Power Distribution Unit (PDU)**
  - One power drop for support of all frames.
  - No need for multiple power drops.
  - ***Similar to SL8500***
  - **New Dual AC Power Support**
  - Complete support for out-of-phase dual power.
  - No need for in-phase power.
  - ***Lower installation time and costs.***



# Power Distribution Unit

Can take power the same as some other libraries



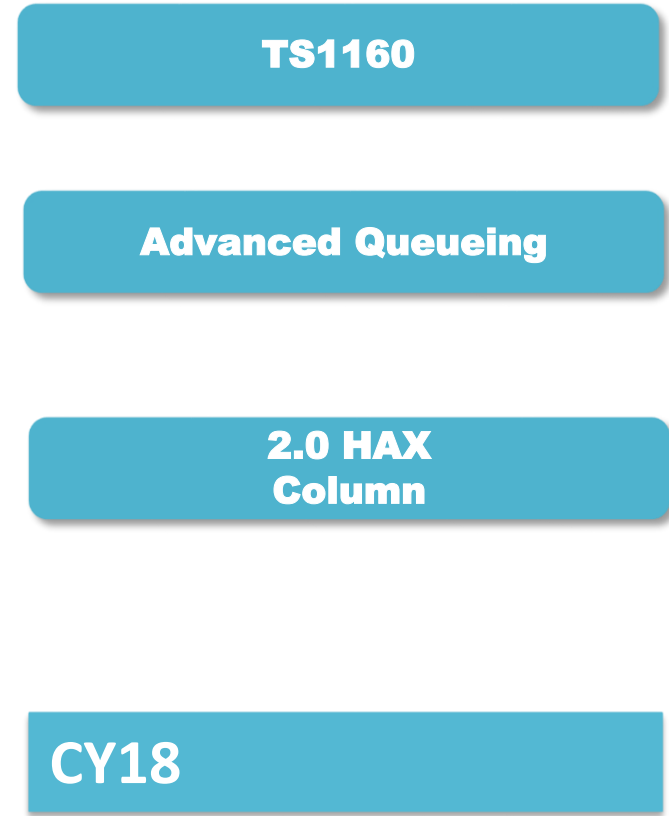
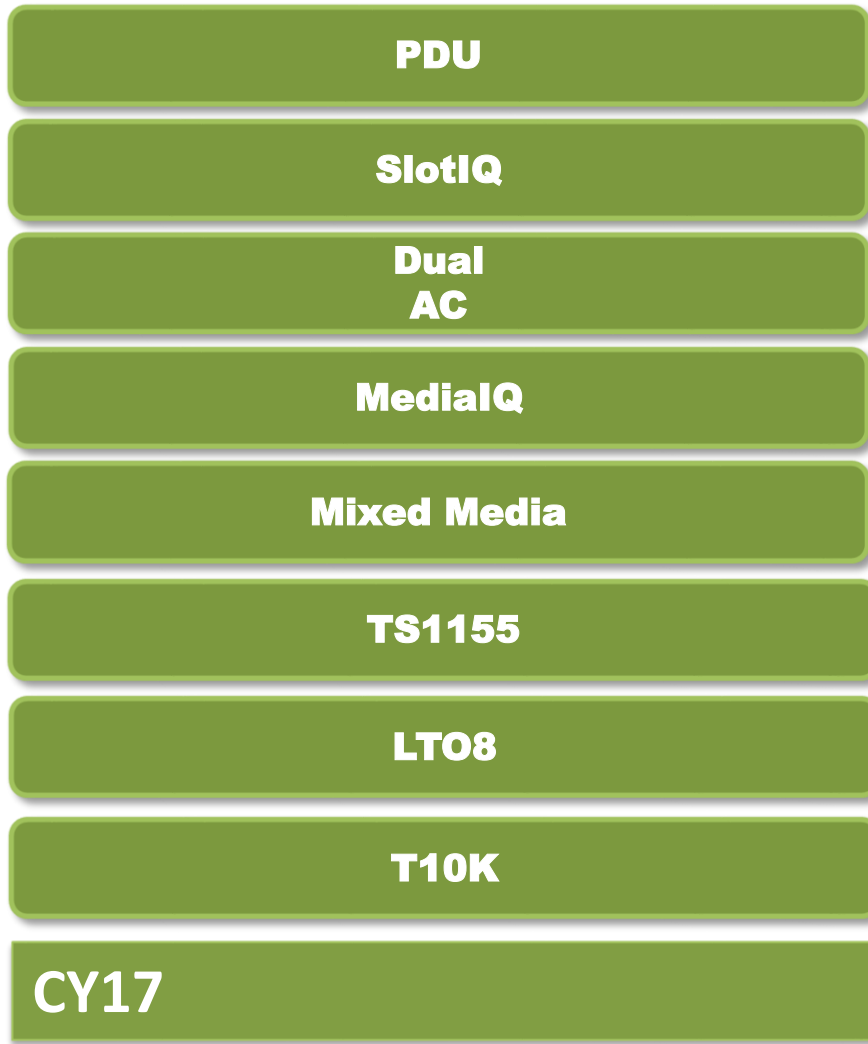
- **Delta Wiring**
  - Requires one three-phase input for each system PDU.
  - 200–240 VAC, line-to-line, three-phase, 40 Amps, 50–60 Hz (mostly used in the United States).
- **Wye Wiring**
  - Requires one three-phase input for each system PDU.
  - 200–240VAC, line-to-neutral, three-phase, 24 Amps, 50–60 Hz (mostly used in Europe).
- **Optional Web Enabled Power Meter**
  - Enables load power balancing across frames

# Tri-media - Three Different Tape Technologies in the same library

- Spectra began with dual-tape technology combining LTO with IBM® TS technology in the same library.
  - Now including Oracle® T10000X technologies.
- Spectra's ExaScale Edition tri-media feature will allow migrating or integrating your existing T10000X media & drives.



# Product Roadmap



# Custom Skins

The range of possibilities for customizing your ExaScale TFinity are almost boundless. Organizations can graphically customize panels nearly any way they would like.







**Questions ?**



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# Society's Genome

