

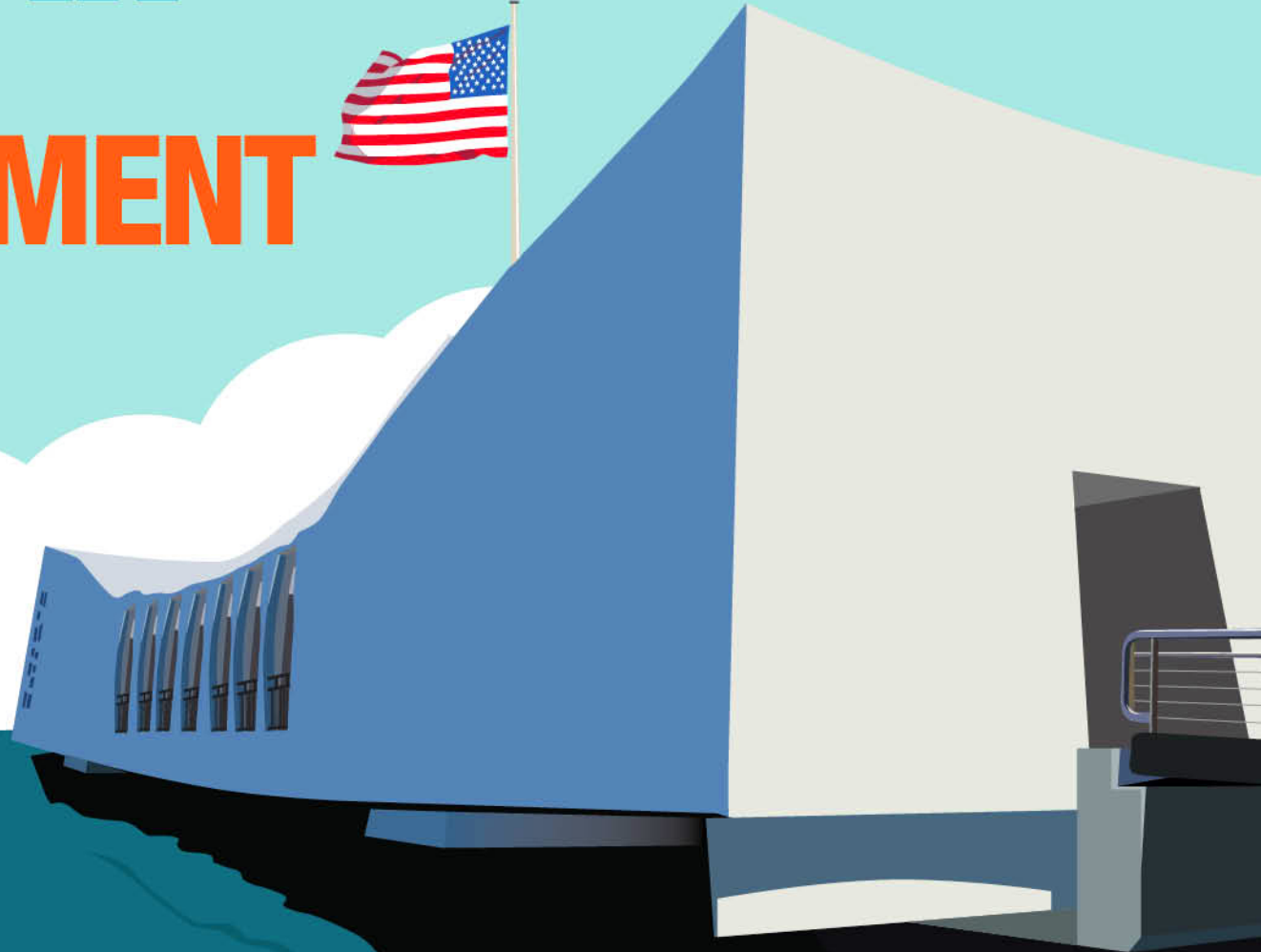
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Meeting Increased Storage and Infrastructure Needs

Accelerate Business Success





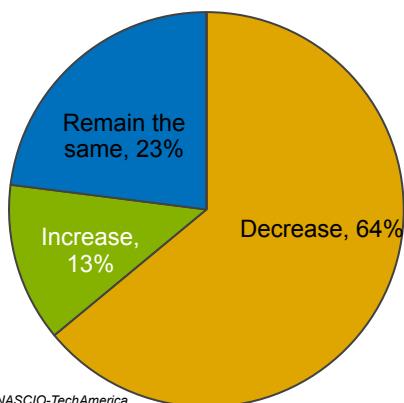
Agenda



- IT Challenges
- Trends
- Standards
- Innovations & efficiencies
- Questions?

Budgets/Funding

- As budgets go down, so does funding for IT
- Many CIOs see budget decreases as an **opportunity** to improve by breaking down barriers, strengthening IT governance, developing creative solutions



*Source: NASCIO-TechAmerica

People

Example: State of Washington

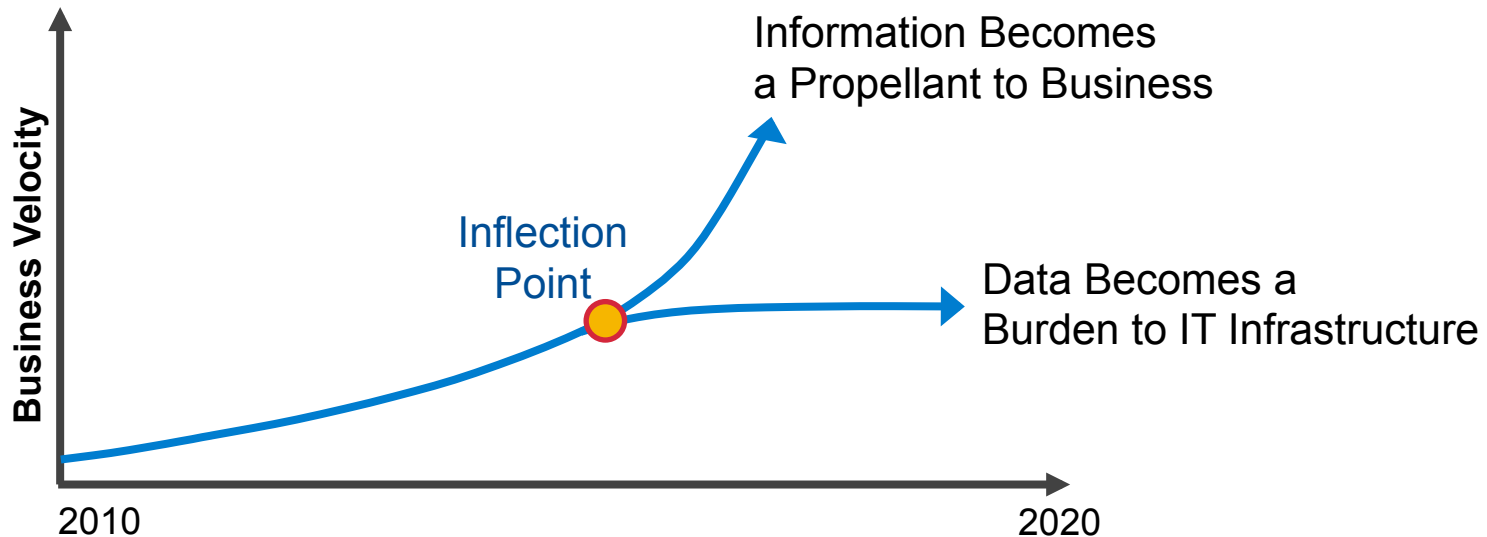
- Of the 3,000 Full and Part time technology employees, more than 50% of the state IT workforce is over the age of 50.
- 25% of the IT workforce has over 20 Years of Service and is over the age of 50 – they are Eligible to retire!
- Less than 5% of the workforce is under the age of 30.
- Salaries rose in Seattle but were reduced for Government employees.

http://ofm.wa.gov/ocio/technology_strategy_022312.pdf

Growth & New IT Pressures

- Data is predicted to grow 800% in the next 5 years.
 - *Gartner tech trends 2011
- Big Data/Unstructured Data and Video will account for 80% of the data growth in the next 5 years.
 - *Gartner tech trends 2011
- Mobility/BYOD - 1 Trillion devices will be connected to the network in 2013 up from 35 Billion in 2010 *Cisco Summit 2011

Data Growth Impact on Business



What's Driving My Information Growth?

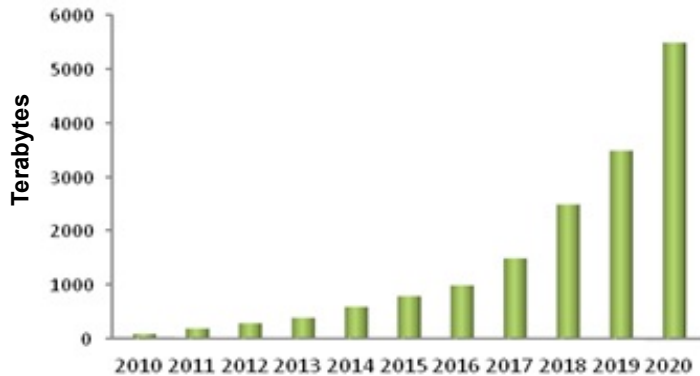
- Mobile Apps
- Decision Support / Analytics
- Machine Generated Data
- Systems of Record
- Systems of Engagement

Where Is My Inflection Point?

- Number of Apps
- % Unstructured Data
- Number of Objects
- Measured Performance vs SLA's
- Measured Capacity and Growth Rate

Relentless Data Growth

A Decade of Monumental Growth*

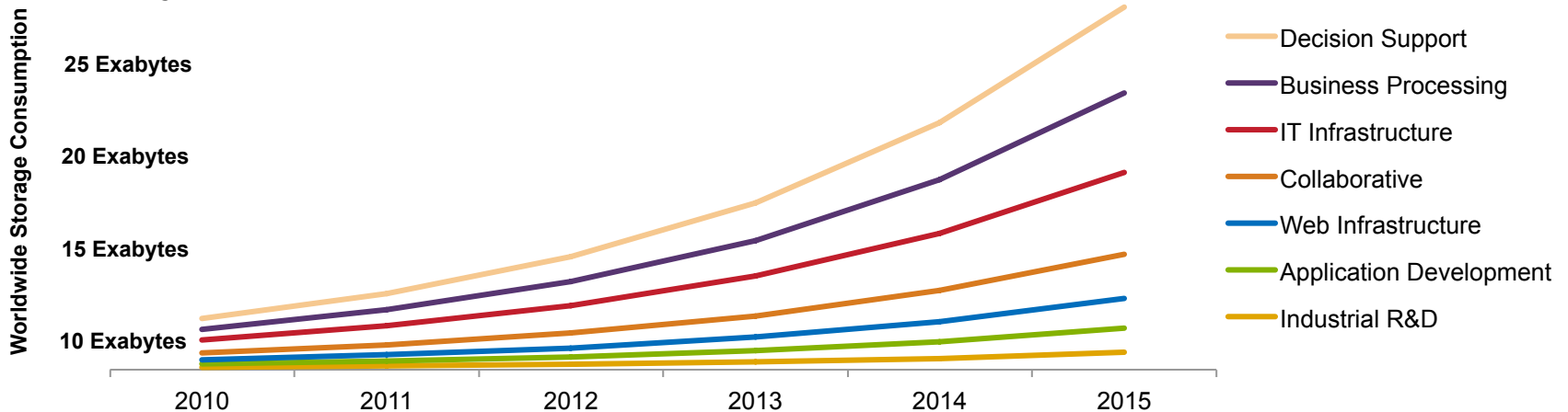


If you were storing 100TB of online data in 2010, you will store:

- 1.1 PB in 2016 (11x)
- 2.5 PB in 2018 (25x)
- 5.8 PB in 2020 (58x)

* Based on industry average 50% annual growth

Projected Enterprise Workload Growth 2010-2015



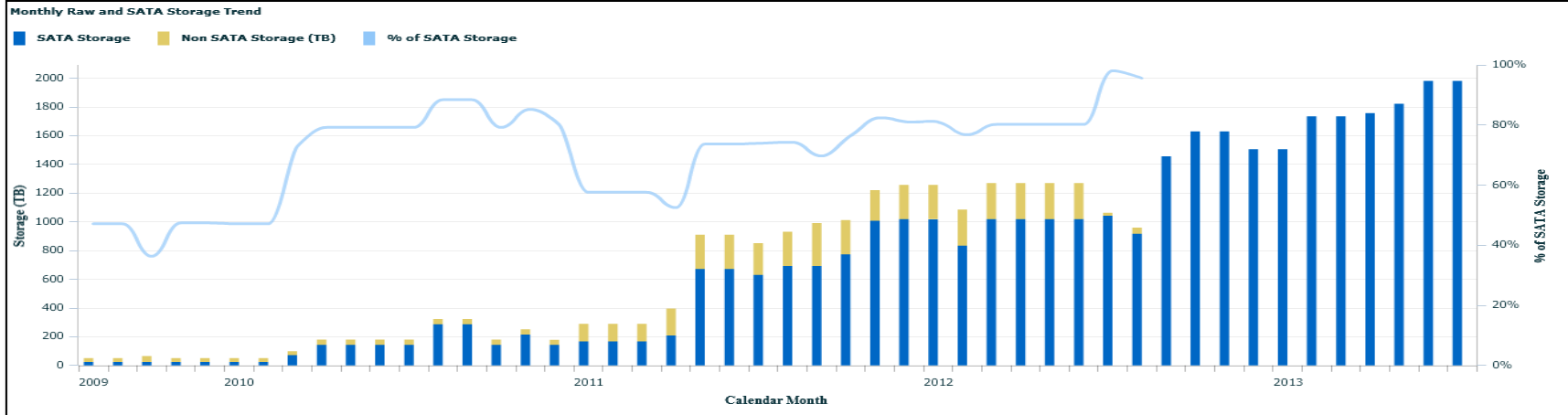
Source: IDC Multi-Client Study, Storage Workloads 2011, September 2011



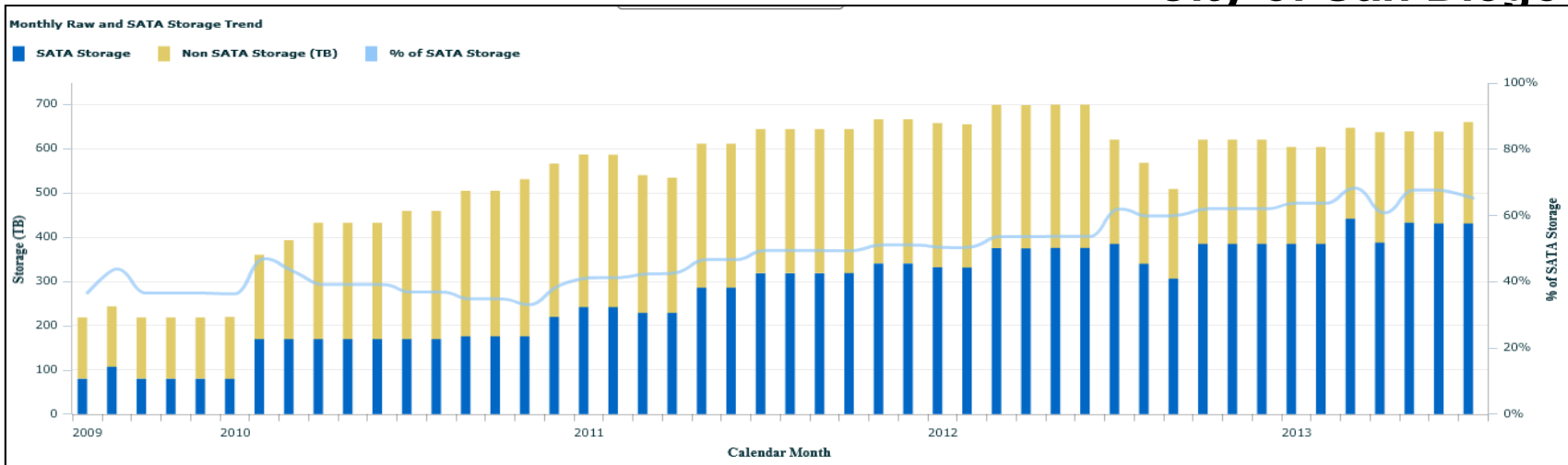
Storage Growth



City of Austin



City of San Diego





Gartner: IT Organizations Should looking at...



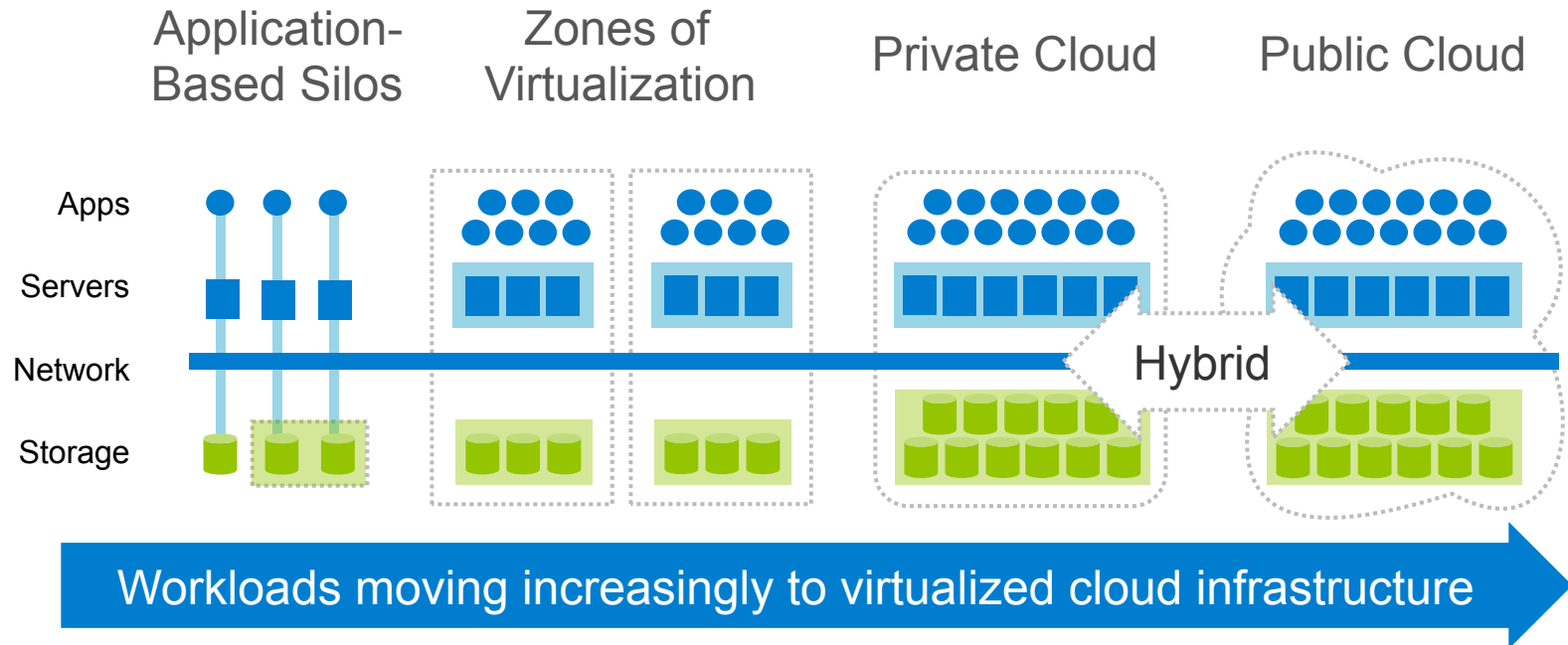
Key Infrastructure as a Service (IaaS) Storage Purchasing Criteria

- **Transparency:** Easy to use and integrate with little or no manual intervention; seamless installation and decommissioning of the storage resource
- **Scalability:** On-demand scaling of capacity, performance, and availability
- **Storage efficiency:** Built-in efficiency at every layer of the IaaS cloud
- **Intelligent caching:** Transparent automation that is optimized for cost-performance by application affinity and workload
- **Unified architecture:** Unified architecture for different workload requirements to reduce management complexity
- **Integrated data protection:** Transparent and seamless data protection for disaster recovery (DR), backup, and archive
- **Continuous operations:** Non-stop data availability with all layers of the IaaS cloud; transparent physical infrastructure life cycle management
- **Secure multi-tenancy:** Multi-tenant for shared storage resources
- **Service automation and analytics:** Accelerated troubleshooting tasks, improved response time, improved time to resolution

“The internal cloud requires a different storage model than the traditional data centers.”

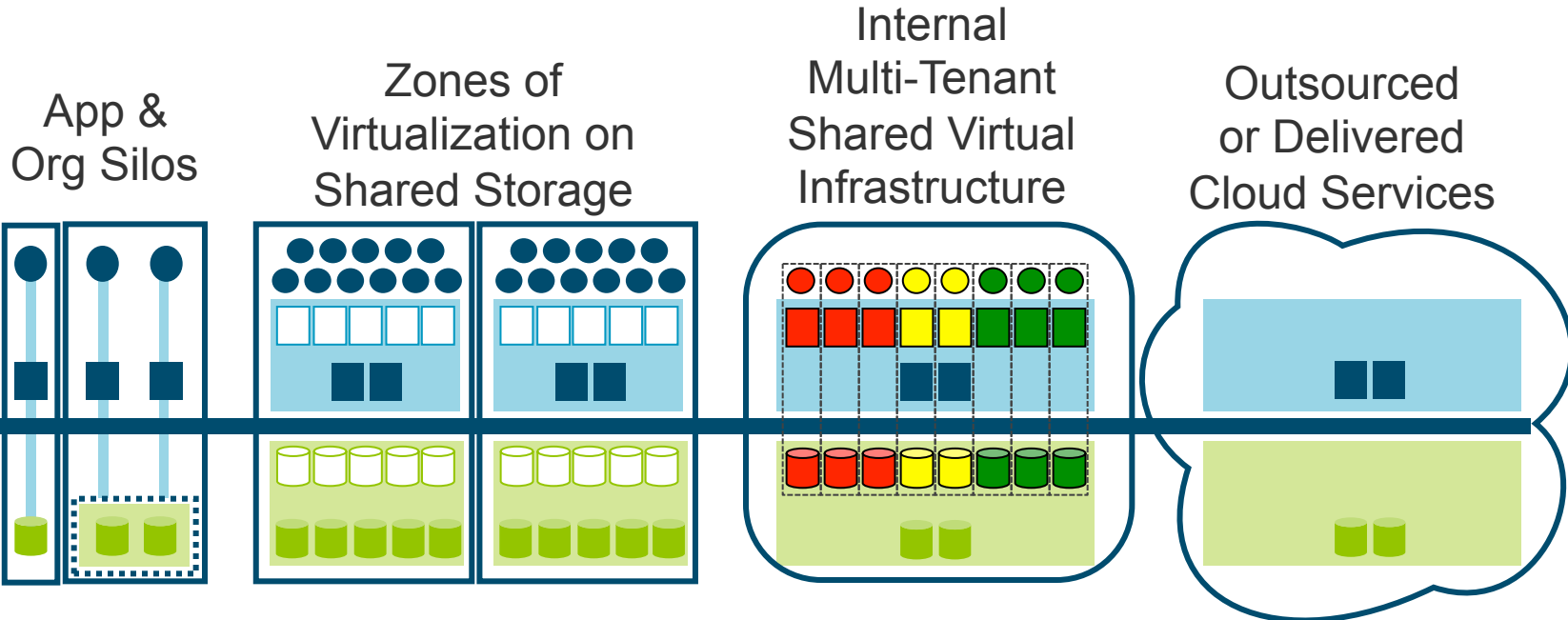
Gartner.

Source: Gartner, [Architecting Storage for the Internal Cloud: One Step at a Time](#), Matthew Brisse, Nov. 10, 2011. The report is available upon request from NetApp.



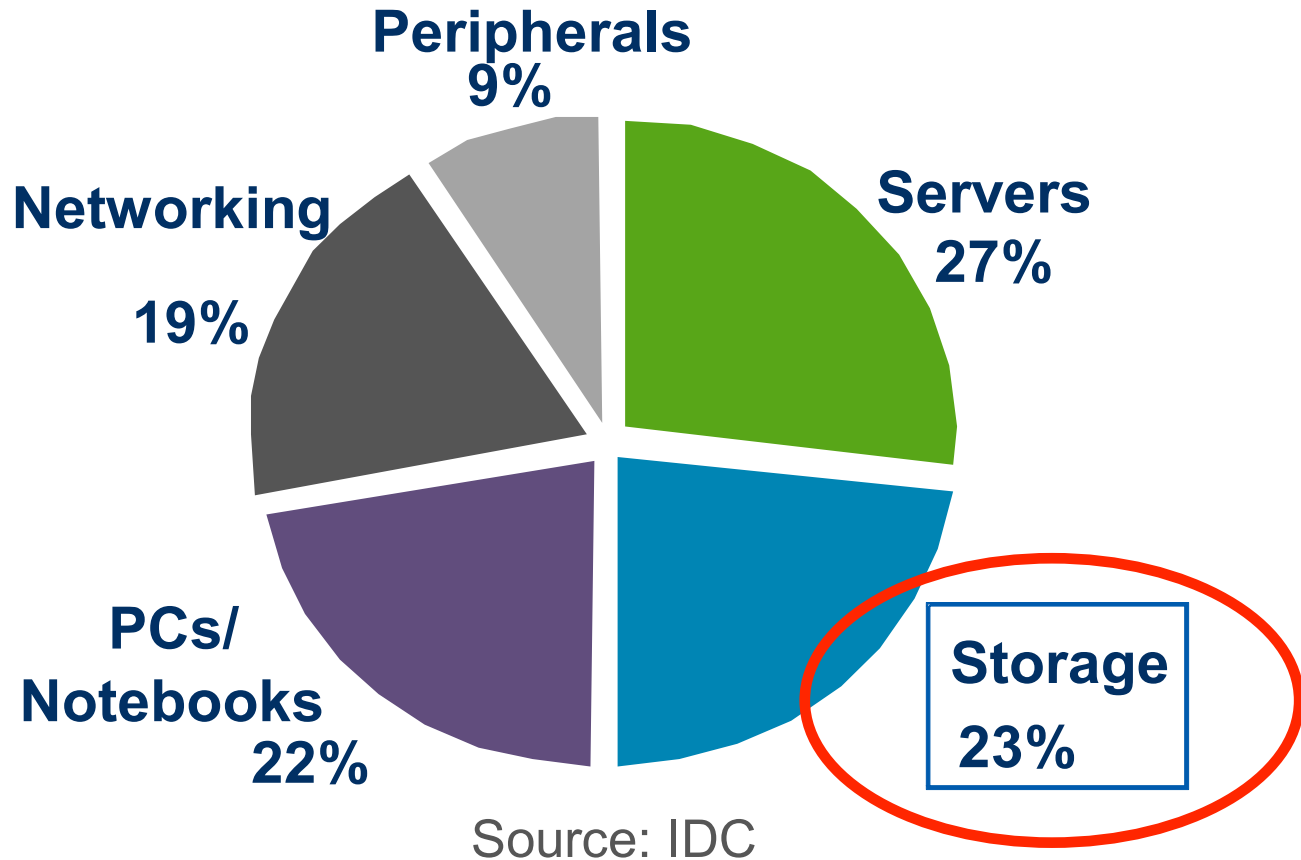
- **Private Cloud:** behind the firewall of an enterprise, closed to public
- **Public Cloud:** accessible via service providers for general purchase
- **Hybrid Cloud:** private clouds linked to public clouds

From Physical to Virtual Silos



IT Gov	Separate	Separate	Unified	Unified
IT Budgets	Separate	Separate	Combined	Combined
Server Util	Low	High	High	High
Storage Util	Low	Low	High	High
Provisioning	Days/Wks	Hours	Minutes	Minutes
Costs	Very High	Medium	Low	Lowest
SLAs	Poor	Better	Strong	Strong
Security	Inconsistent	Better	Strong	Strong

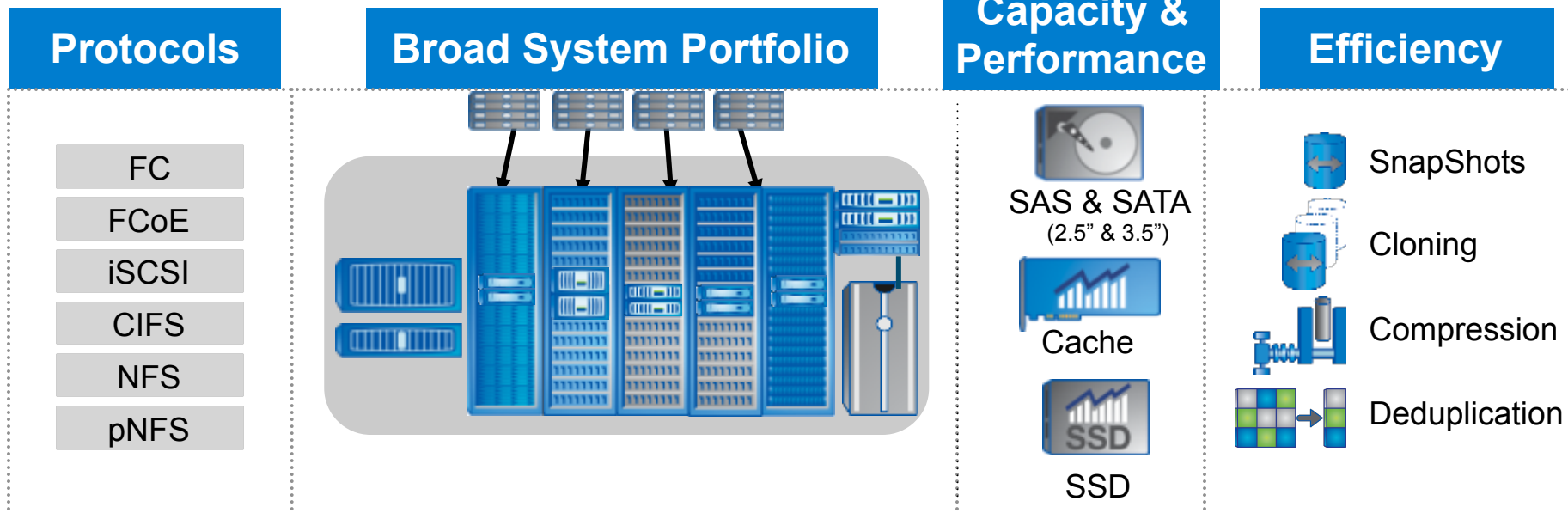
Virtualized + Multi-tenant & Automated + Mobile



- Cost of storage is current 2nd largest capital expenditure, and growing rapidly.

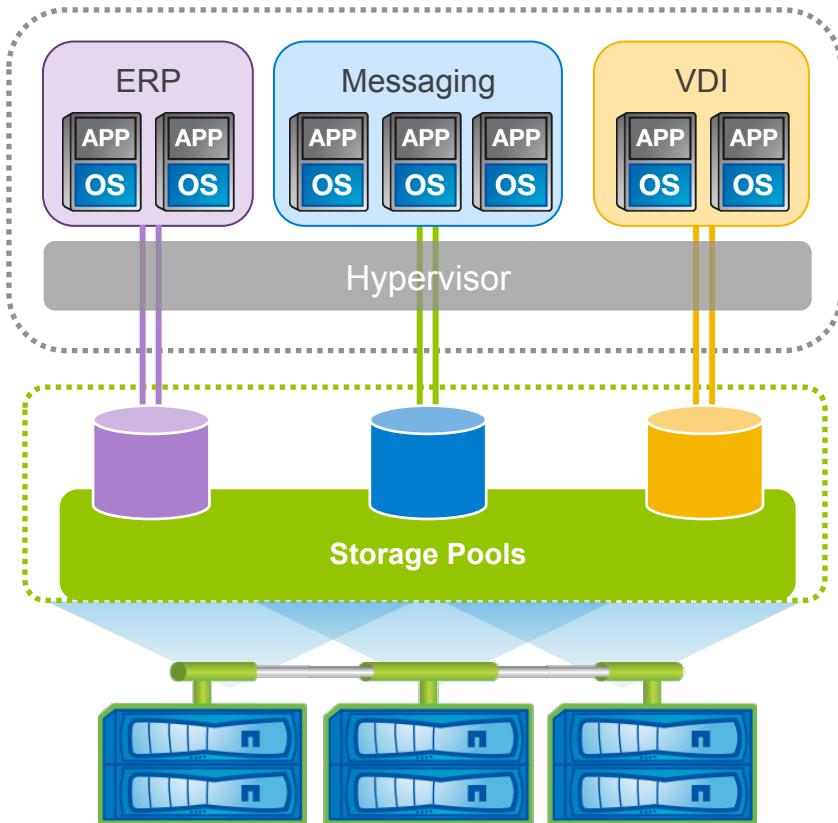
Unified Architecture

Benefit: One architecture for many diverse workloads



Unified Management

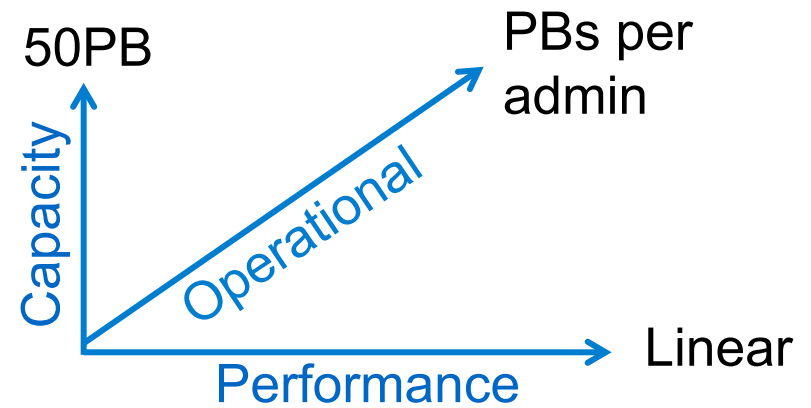
- Use one or limited processes: learn once, run everywhere
- Integrated data management
- Integrated storage efficiency
- Integrated data protection
- Unify across vendors
- Reduce complexity and risk



Address data growth

- Grow from small to large
- Respond immediately
- Simple, consistent management

Scale in 3 dimensions



Storage Efficiency

Benefit: Cost containment in an era of monumental growth

Low-cost components

- SATA drives
- Intelligent Cache

Data reduction

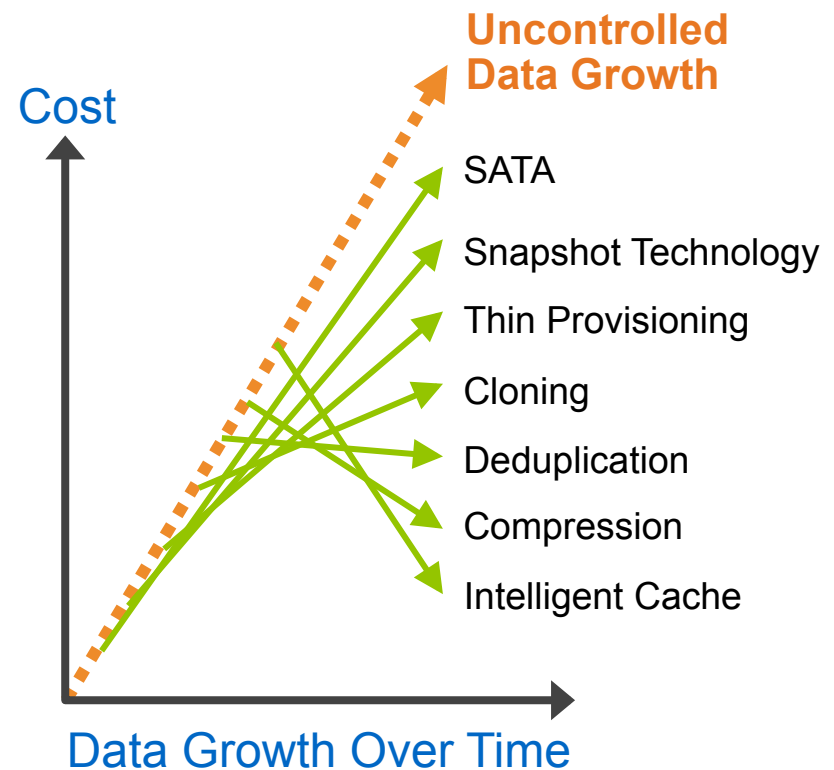
- Deduplication
- Compression

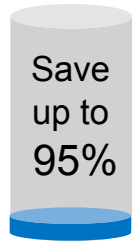
Increased utilization

- Thin Provisioning
- Unified architecture

Fewer full copies

- Space saving Clones
- Deduped backup





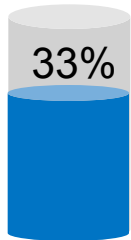
Deduplication

Saves up to 95% for full backups;
25% to 55% for most data sets



Snapshot Copies

Snapshots do not require
“copy” space, serve local
backup purposes, delivers
savings of up to 80%



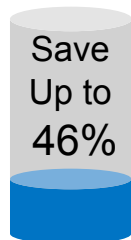
Thin Provisioning

20% to 33% typical savings



Thin Replication

Disk-to-disk data protection saves
up to 95%



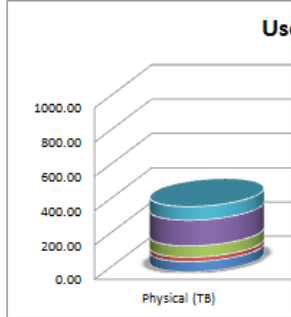
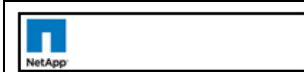
RAID-6

Saves up to 46% versus mirrored
data or RAID 10

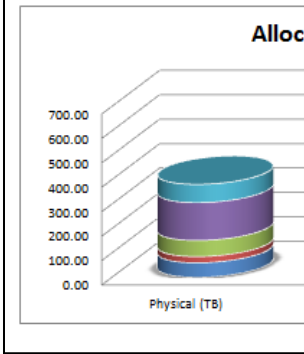
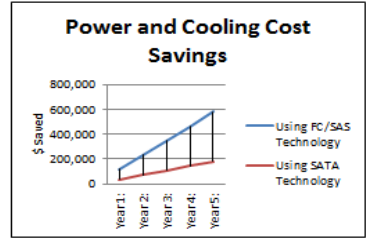
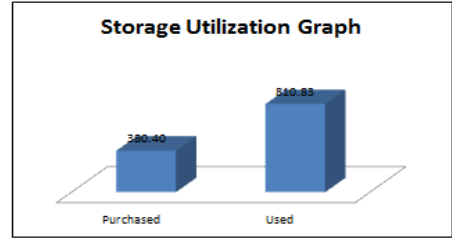
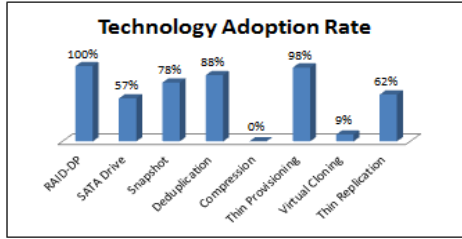


Virtual Clones

Savings equal size of the original
data set minus blocks subsequently
changed in clone



1-Pager for Florida Dept of Financial Services



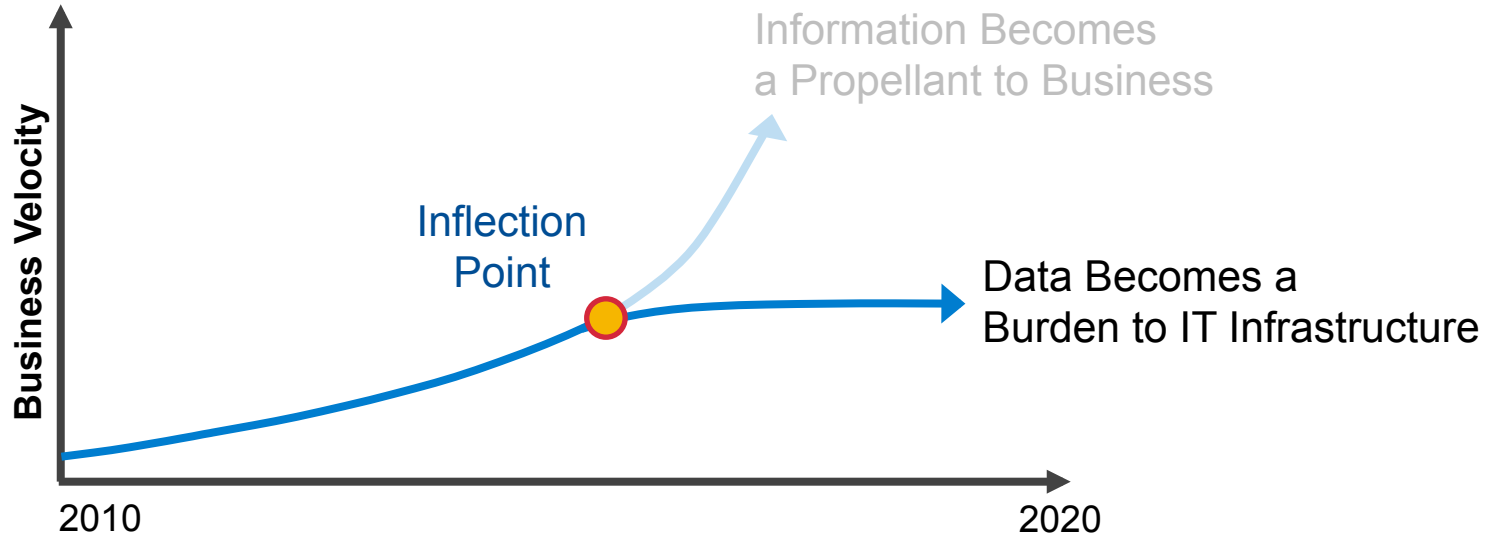
Feature or Benefit	How We Do It	NetApp Savings
Deduplication	Deduplication searches for and removes duplicate data. NetApp is the market leader in deduplication, with thousands of customers using NetApp deduplication across a broad variety of applications and storage tiers, including primary storage, replicated storage, backup storage, and archival storage.	66.39 TB
Data Compression	Inline data compression extends efficiency and increases utilization for file services, engineering applications and seismic data.	
Thin Provisioning	NetApp thin provisioning allows users to oversubscribe their data volumes, resulting in very high utilization models. Many of our customers report 100% or greater raw versus usable storage utilization based on thin provisioning alone.	202.6 TB
FlexClone Writable Snapshot Copy	FlexClone® copies are invaluable in test/dev environments. Instead of provisioning a large storage capacity to perform application testing, the production application data is "shared" with the test data, resulting in extreme storage efficiency.	32.37 TB
Snapshot Technology	Not all snapshots are created equal. NetApp wrote the book on Snapshot technology over 15 years ago, and we still provide the most space-efficient snapshots in the industry. Up to 255 Snapshot copies of any volume can be maintained without excessive space penalties. Our competitors are limited to far fewer snapshot copies before a complete baseline image must be copied along with the snapshot.	Average of 40.87 days of backups, kept for 0.04% 195.66 TB - 644.01 TB
Thin Replication	With SnapMirror® and SnapVault®, only incremental block changes are transferred after the baseline copy is made. These "thin transfers" reduce the storage space required at the destination, and they also reduce	
RAID-DP	As larger disk drives are used to store more critical data, resiliency becomes paramount. NetApp RAID-DP provides protection against dual-drive failures, at a fraction of the capacity required by RAID mirroring techniques.	
High-Density SATA Disk Drives	SATA drives used with RAID-DP® allow high-capacity drives to be used in demanding environments. Also, with the NetApp Performance Acceleration Module card, data is cached in secondary memory and disk access becomes less frequent. The result is that larger SATA drives can be used for higher performance applications.	
		Total Amount of Space Saved: 497.02 TB - 945.38 TB
		Storage Asset Utilization: 213.15%

Agile Customer Example: AZ Dept of Economic Security

- 10,000 employees
- Annual Budget \$4.5B
- 700 physical servers / 400 servers virtualized
- 30 to 40 servers per blade
- 30 to 1 storage consolidation
- Reduced Rack space by 93%
- Data lives on 50% less storage
- Full converged infrastructure
 - Private Cloud
 - Charge back
 - Bursty workloads
 - load balancing



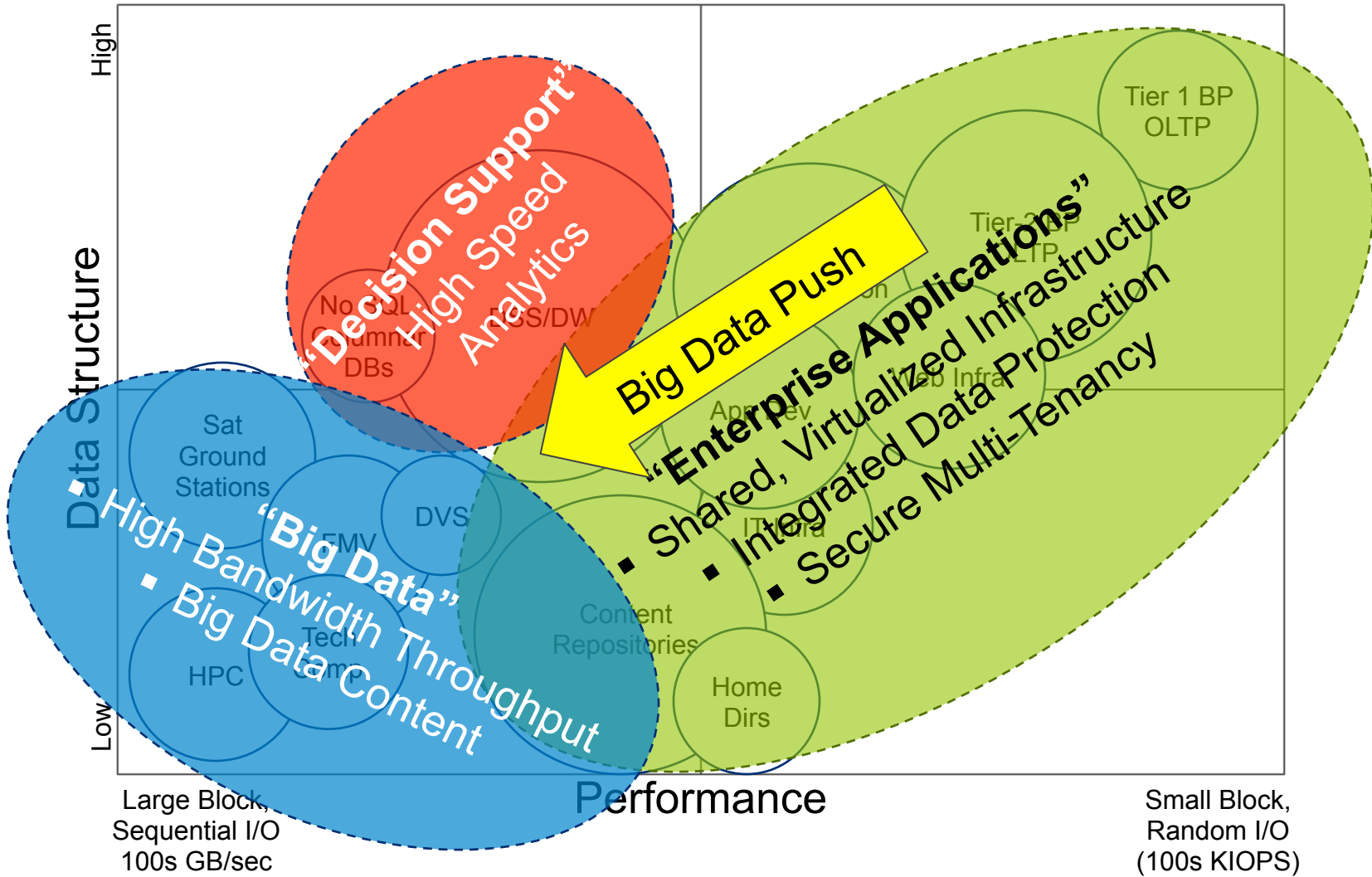
Is Your IT Infrastructure Good Enough?



Thank you



The Big Data Push

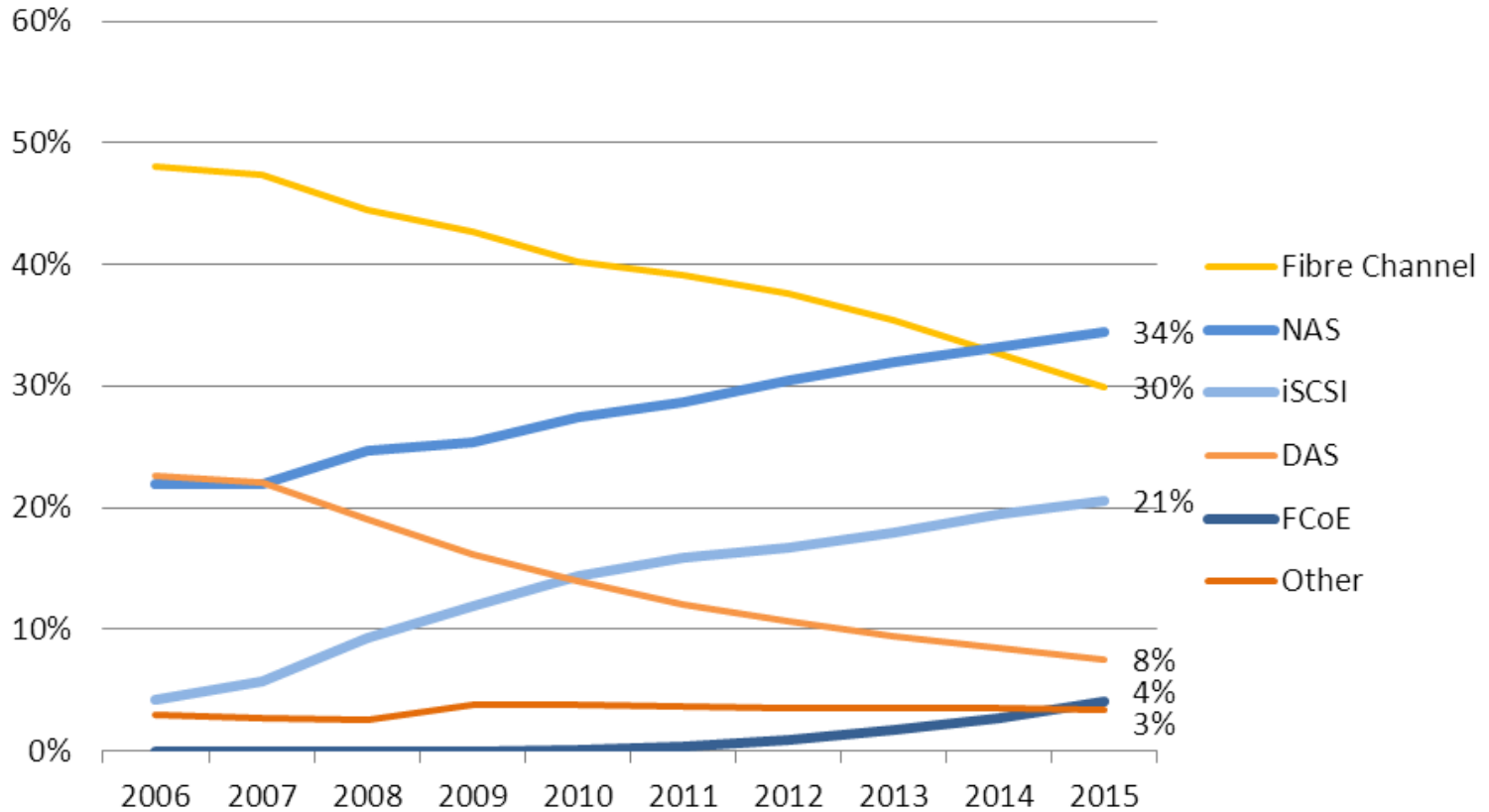




Ethernet Speeds push File Protocols to Lead Storage by 2015



Capacity Share by Protocol



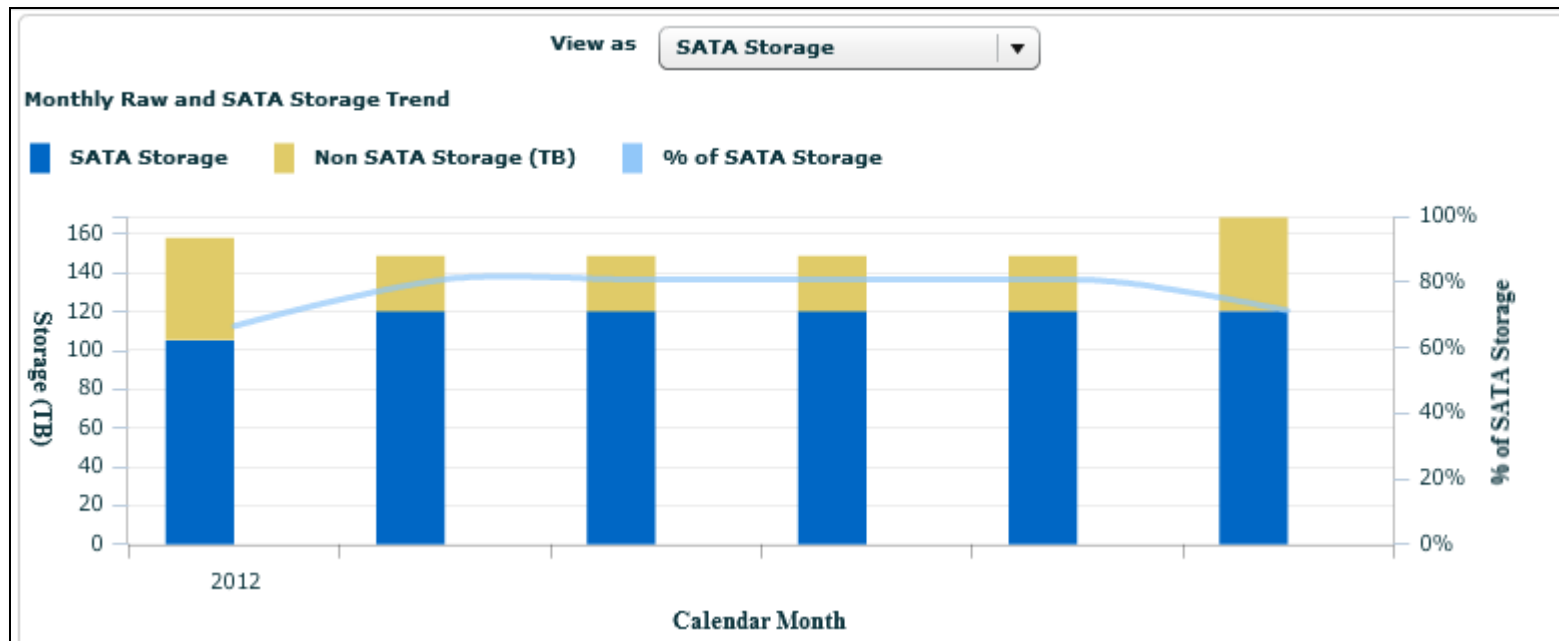
Worldwide Enterprise Storage Systems 2010-2015 Forecast,
Source: IDC



Wisconsin – Dept. of Revenue



Month ▼	SATA Storage (TB)	SATA Disk %	Dedupe Enabled (TB)	Dedupe Not Enabled (TB)	Dedupe Coverage %	Dedupe Efficiency Factor	FlashCache Enabled (TB)	FlashCache Not Enabled (TB)	FlashCache %
201211	120	71	116	108	52	1.21	191	0	113
201210	120	81	120	83	59	1.17	169	0	114
201209	120	81	145	88	62	1.38	169	0	114
201208	120	81	145	92	61	1.48	169	0	114
201207	120	81	145	101	59	1.47	169	0	114
201206	105	67	142	2	98	1.45	157	0	100





Agile Customer Example: Iowa Workforce Development



- Deployed 1,500 Virtual Desktops across the State of Iowa in 6 Months
- Implemented 2x the Targeted Number of Virtual Access Points
- Reduced Storage by 50%
- Saved \$6.5 Million Annually



UH Storage Challenges

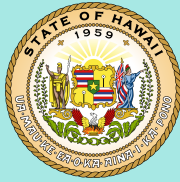
■ Security

- Administrative Rules (Firewalls) Don't Work for Education & Research
- Safe But Accessible
- Compliance
 - EAR, FERPA, FISMA, HIPPA, ITAR

■ Not All Storage Is Not Equal

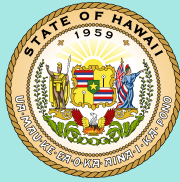
- What works for business does not work for big data research

■ Big Storage Needs Big Bandwidth



UH Research and Big Data

- Pan-STARRS 2 (2014): 3 Terabytes/Night
- UH HPC Condominium (2014): 100teraFLOP Cluster connecting to other HPC Clusters across the country (teraFLOP: 1 Trillion Floating Point Operations/Second)
- Three Storage Needs
 - Temporary
 - Processor Intensive
 - Archival



Big Storage Needs Big Bandwidth

Time to Copy 1 Terabyte

On a...

- 10 Mbps network: 300 hrs (12.5 days)
- 100 Mbps network: 30 hrs
- 1 Gbps network: 3 hrs (are your disks fast enough?)
- 10 Gbps network: 20 minutes (fast disks and fast filesystems)

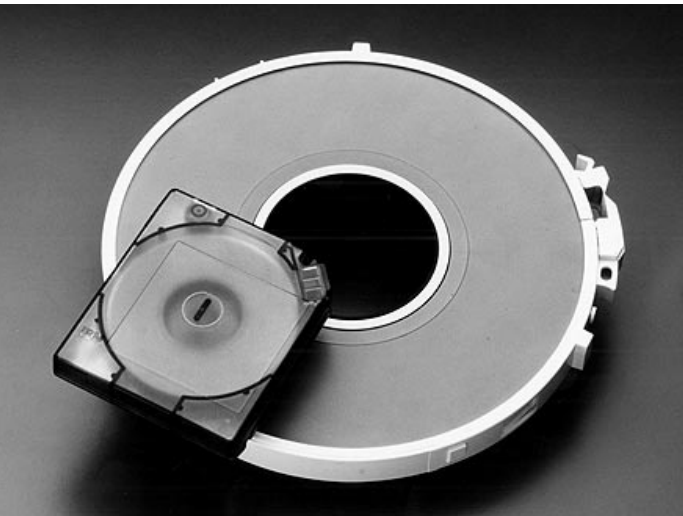
These figures assume some headroom left for other users



UH Storage Solutions

- Network: 10 Gb
- Security: Appliance, Research Network DMZ
- Compliance: Store in USA
- Storage to Meet Every Need
 - Google: Average – 330 Mb/user
 - Local Storage: Fast or Archival in IT Center
 - Collaborative Cloud: Condo of Condos, Net+

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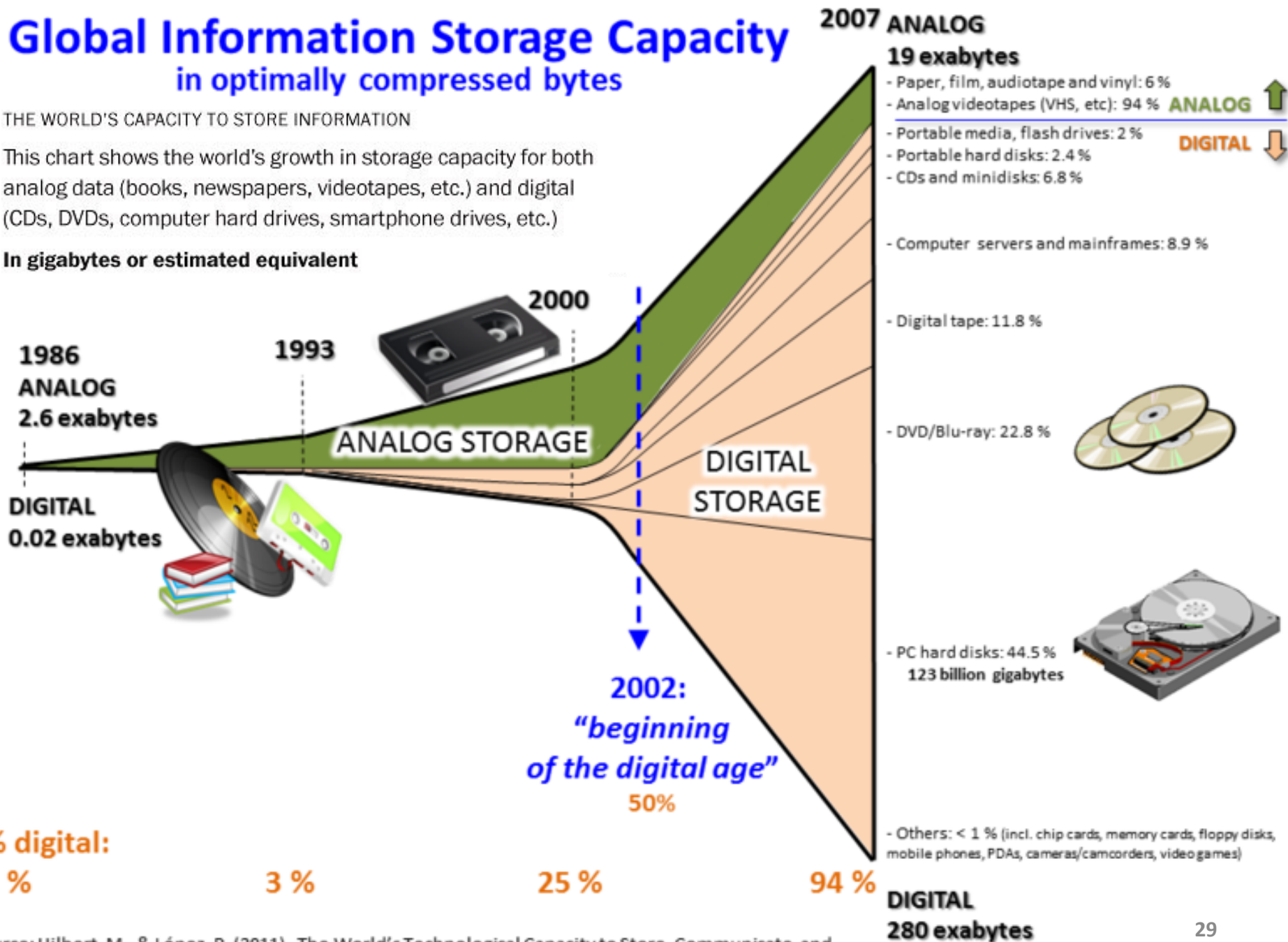
T3: Meeting Increased
Storage & Infrastructure

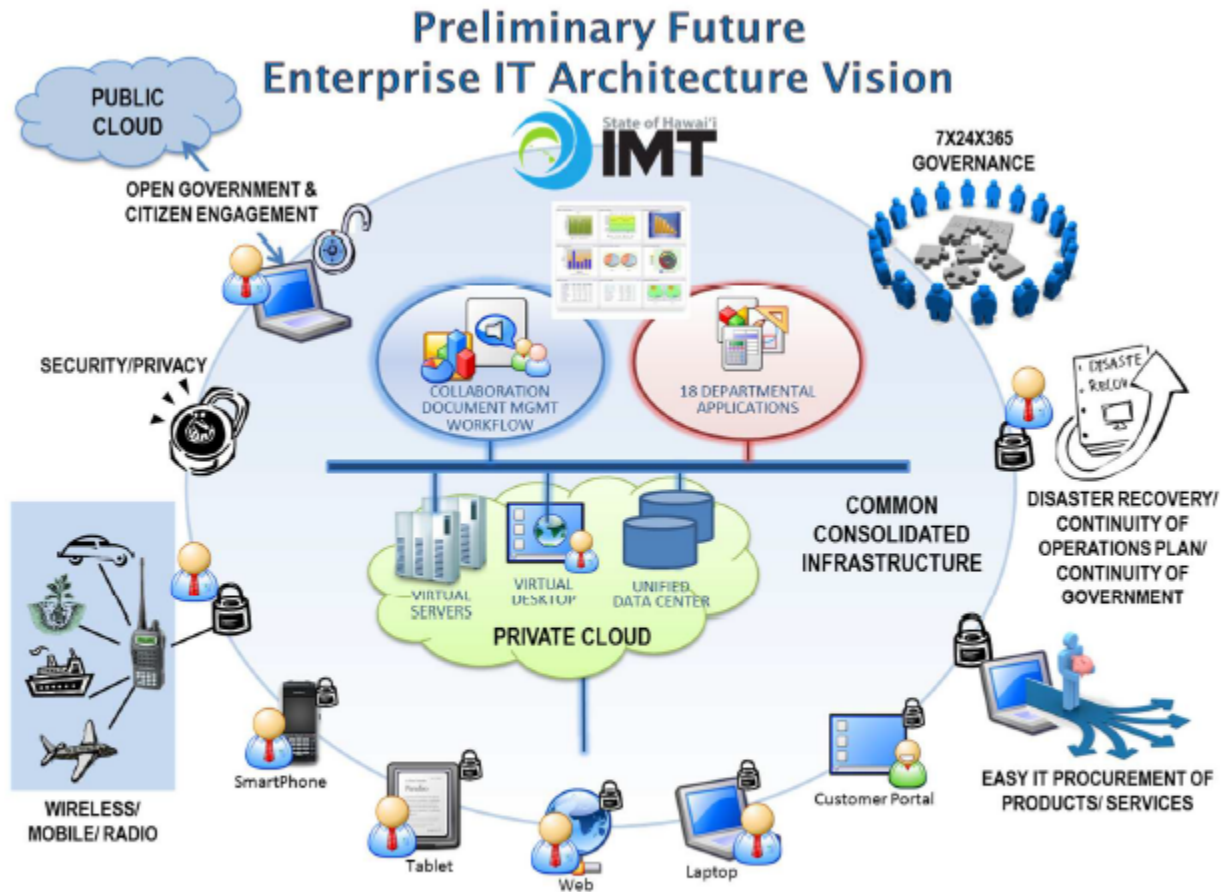
Global Information Storage Capacity in optimally compressed bytes

THE WORLD'S CAPACITY TO STORE INFORMATION

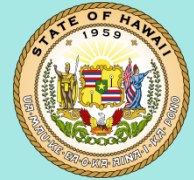
This chart shows the world's growth in storage capacity for both analog data (books, newspapers, videotapes, etc.) and digital (CDs, DVDs, computer hard drives, smartphone drives, etc.)

In gigabytes or estimated equivalent

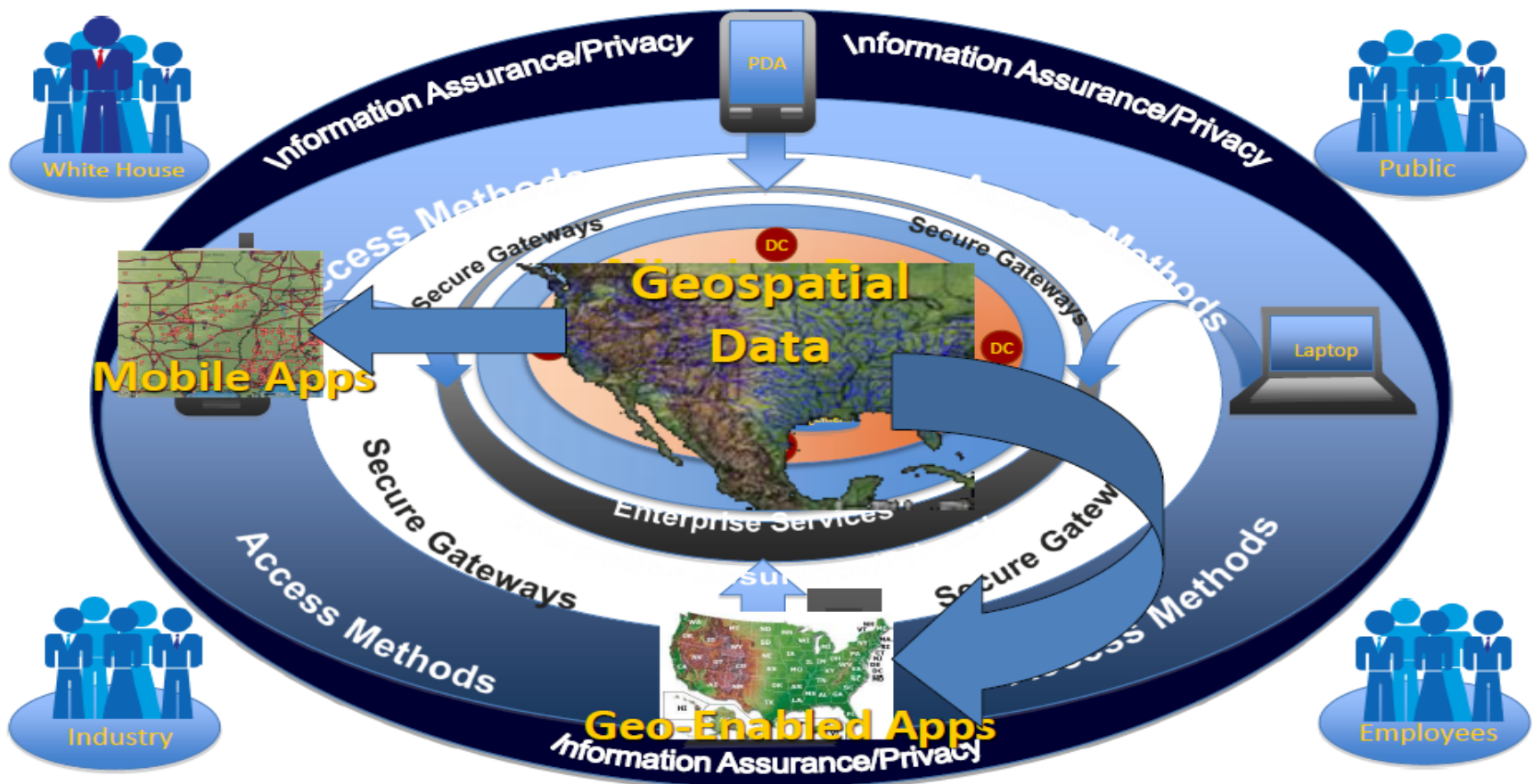




Access to the right information – anywhere, any time, any mission, securely and reliably



Notional Vision



Access to the right information for authorized users any time, anywhere, any mission, securely and reliably



■ Summary

- Be aware of the security requirements and adhere to the most stringent requirement
- Keep current on trends
- Join the Data Loss Prevention team, Open Data team, Business and IT Reengineering team, or the Data Center Consolidation team