

# Clouds, Convergence & Consolidation

*The future of Enterprise Storage?*

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# About The 451 Group

Independent technology industry analyst company

Focused on the business of enterprise IT innovation

1000+ customers across

- Vendors
- Investors (150 VCs and 80 Investment Banks)
- Service-providers (SIs, consulting, etc.)
- End users

Offices in New York (HQ), Boston, London, SF

- 120+ total employees w/ 35+ analysts

**Tier1 Research covers hosting, colocation, content delivery, Internet and enterprise services**

**Uptime Institute, acquired in 2009, a think-tank, research and consulting firm focused on data center availability and efficiency**



# Enterprise Storage: Ripe for disruption?

## Cloud Storage

- represents a threat to conventional storage as a substitute for primary, secondary and disaster recovery systems.

## FCoE

(Fibre Channel over Ethernet)

- will help enable the convergence of fibre channel SANs and IP networks.

## Storage tiering and caching

- automated storage optimization is being built into storage systems and could accelerate Solid State Storage adoption.

## Storage/Server consolidation

- the move to commodity hardware, coupled with embedded hypervisors could reduce server footprint in the data center.

# What's in a cloud?

- ❑ On-demand access to IT infrastructure
- ❑ Compute, memory, process power, bandwidth, storage – on demand
- ❑ No capex (public clouds) – just opex
- ❑ Unlimited scalability
- ❑ Order/provision from anywhere
- ❑ Scalable on the fly (up/down)
- ❑ Easy Web management interface
- ❑ Pay per use

# Cloud criteria vs. architecture

## CLOUD CRITERIA

Publically Accessible  
**Programmatic Management  
Interfaces**

**Multi-tenant Architecture**  
Multi-tenant Architecture  
**Accounting Granularity and  
Cost Allocation**

**Scalability and Elasticity**  
Scalability and Elasticity  
**Rich Web Management  
Capabilites**

**Rapid Provisioning and Self-Service**  
Rapid Provisioning and Self-Service  
Virtualization and Hardware  
Independence

## CLOUD ARCHITECTURE

4

**PUBLIC CLOUD  
ARCHITECTURE**

3

**PRIVATE ENTERPRISE  
CLOUD**

2

**CLOUD-LIKE ENTERPRISE  
ARCHITECTURE**

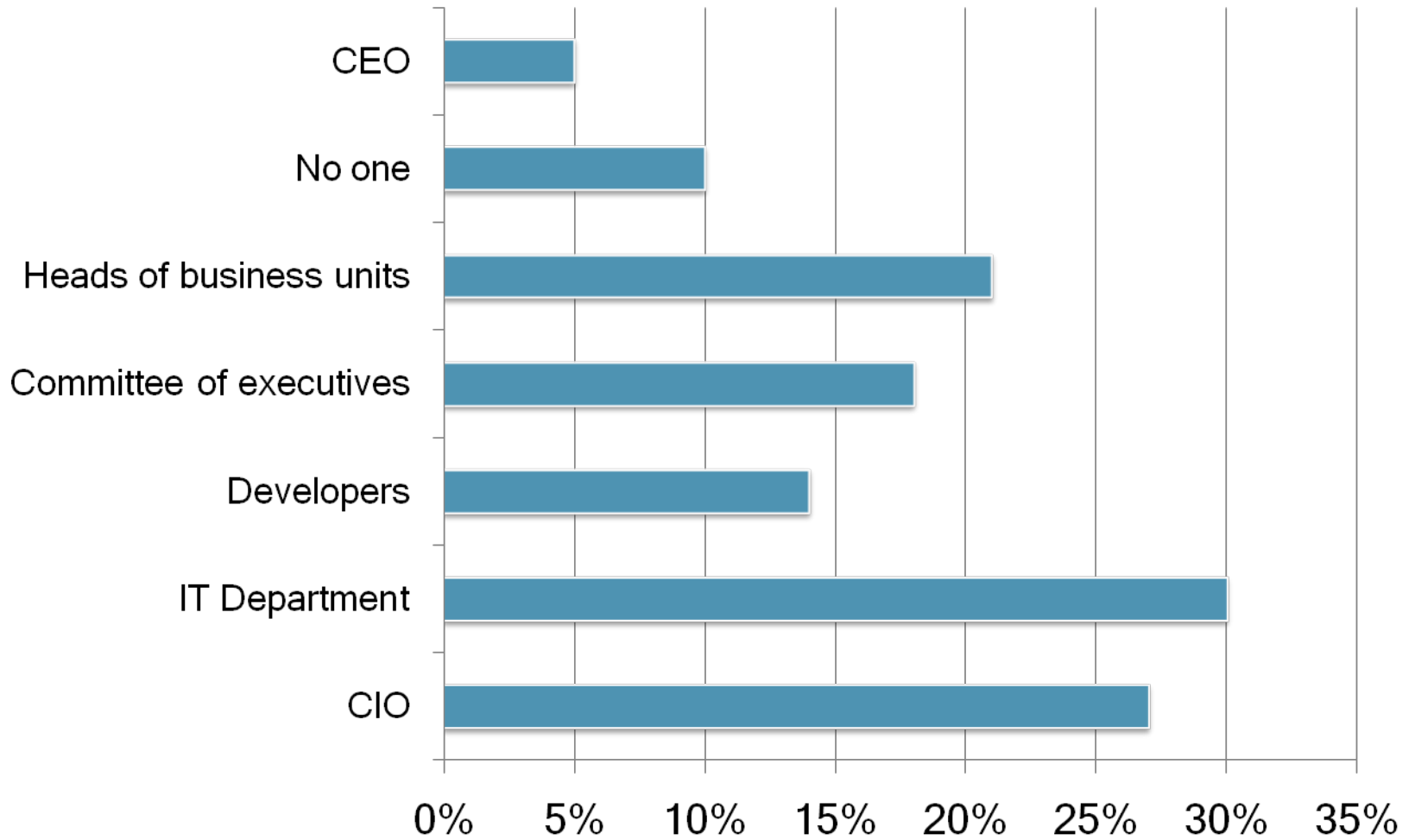
1

**MODERN ENTERPRISE  
ARCHITECTURE**

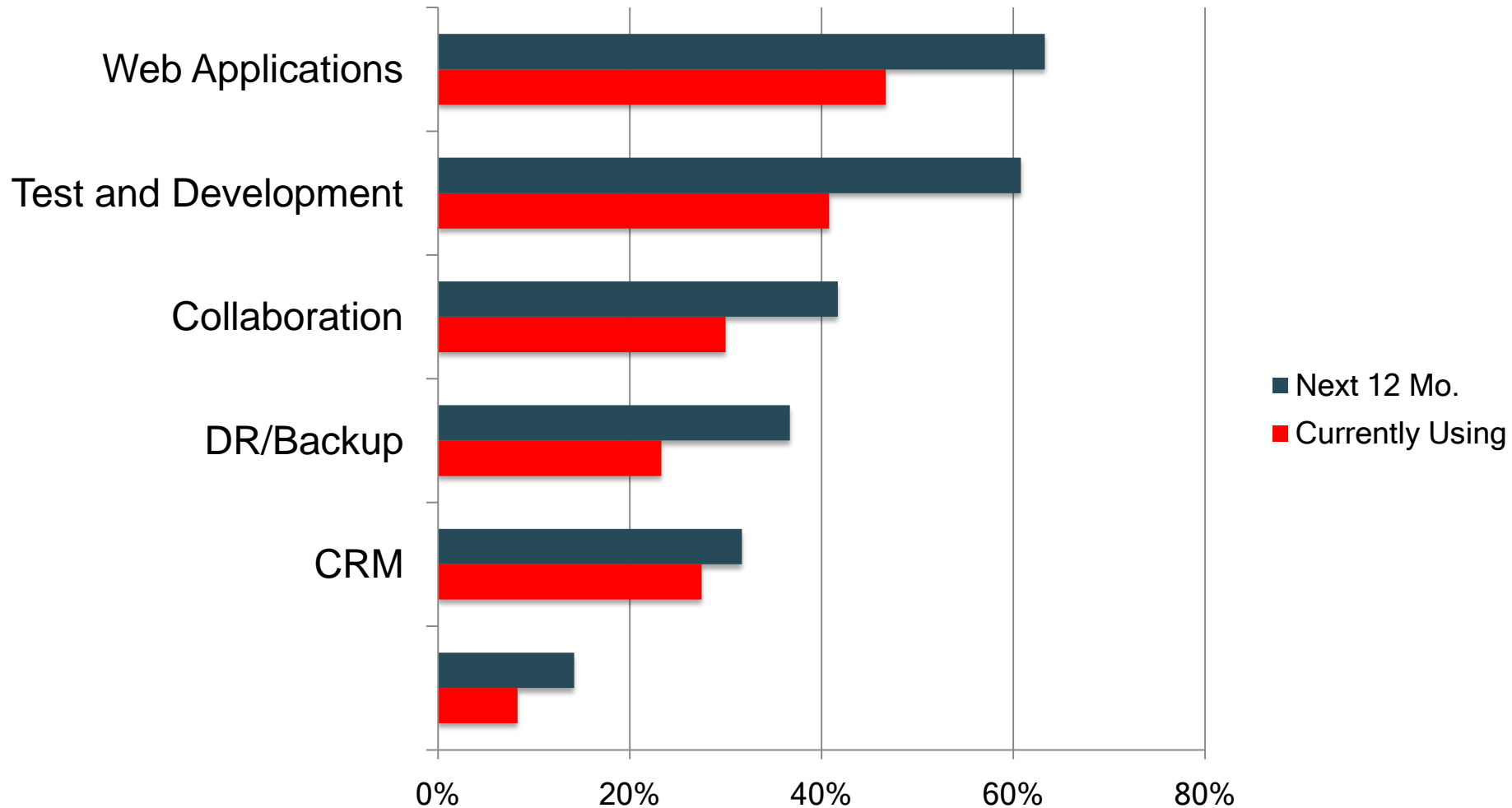
# Survey details

- ❑ ~120 end user organizations participated between April and May 2010
- ❑ Geographic Distribution:
  - ❑ North America 59%
  - ❑ Europe 32.5%
  - ❑ Asia 5.1%
- ❑ Company size (revenue)
  - ❑ 13 with \$10bn or more
  - ❑ 15 with \$1bn to \$10bn
  - ❑ 23 with \$250m to \$1bn
  - ❑ 11 with \$10m to \$250m
  - ❑ 51 with revenue under \$10m

# Who is driving adoption?



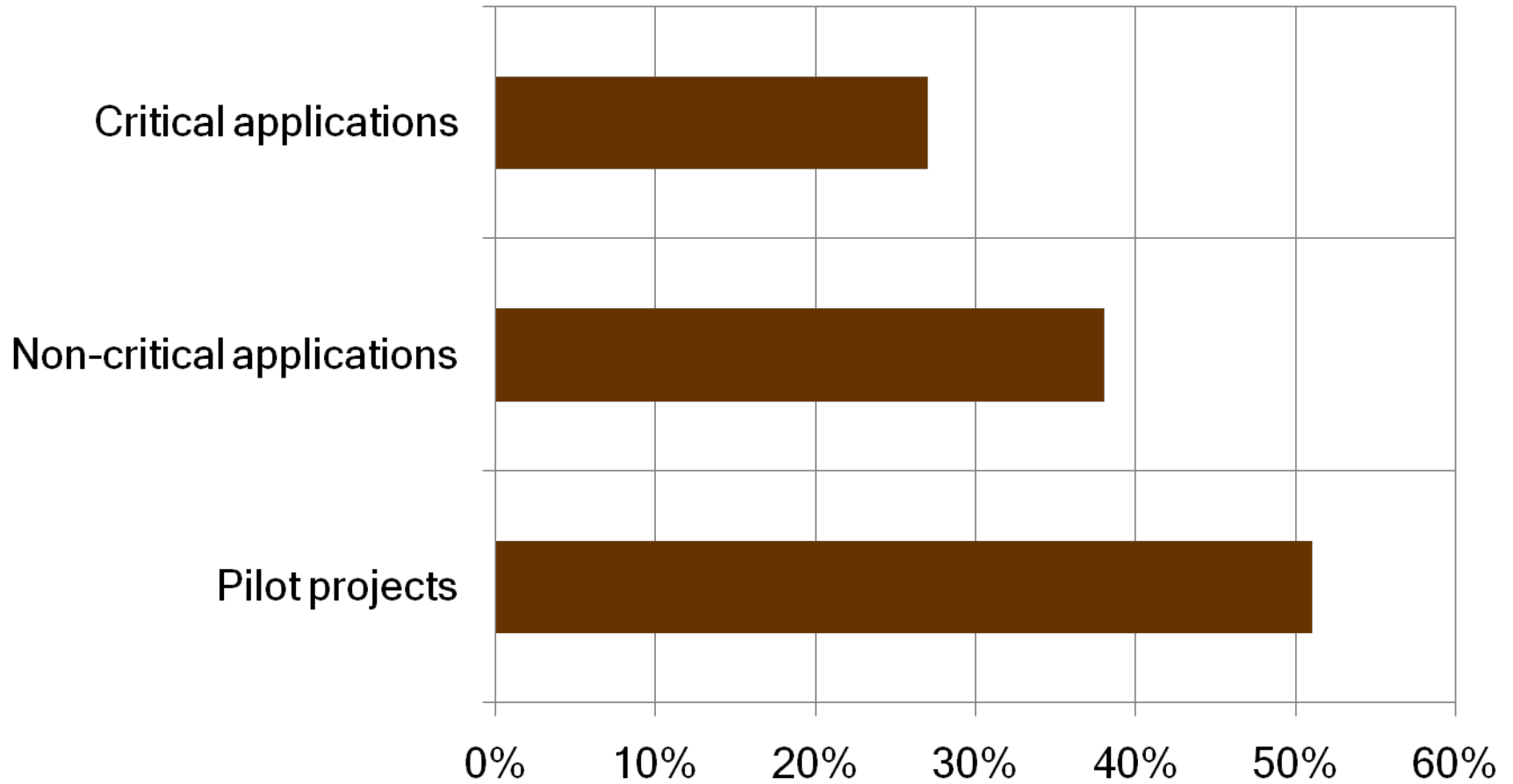
# Cloud adoption by workload



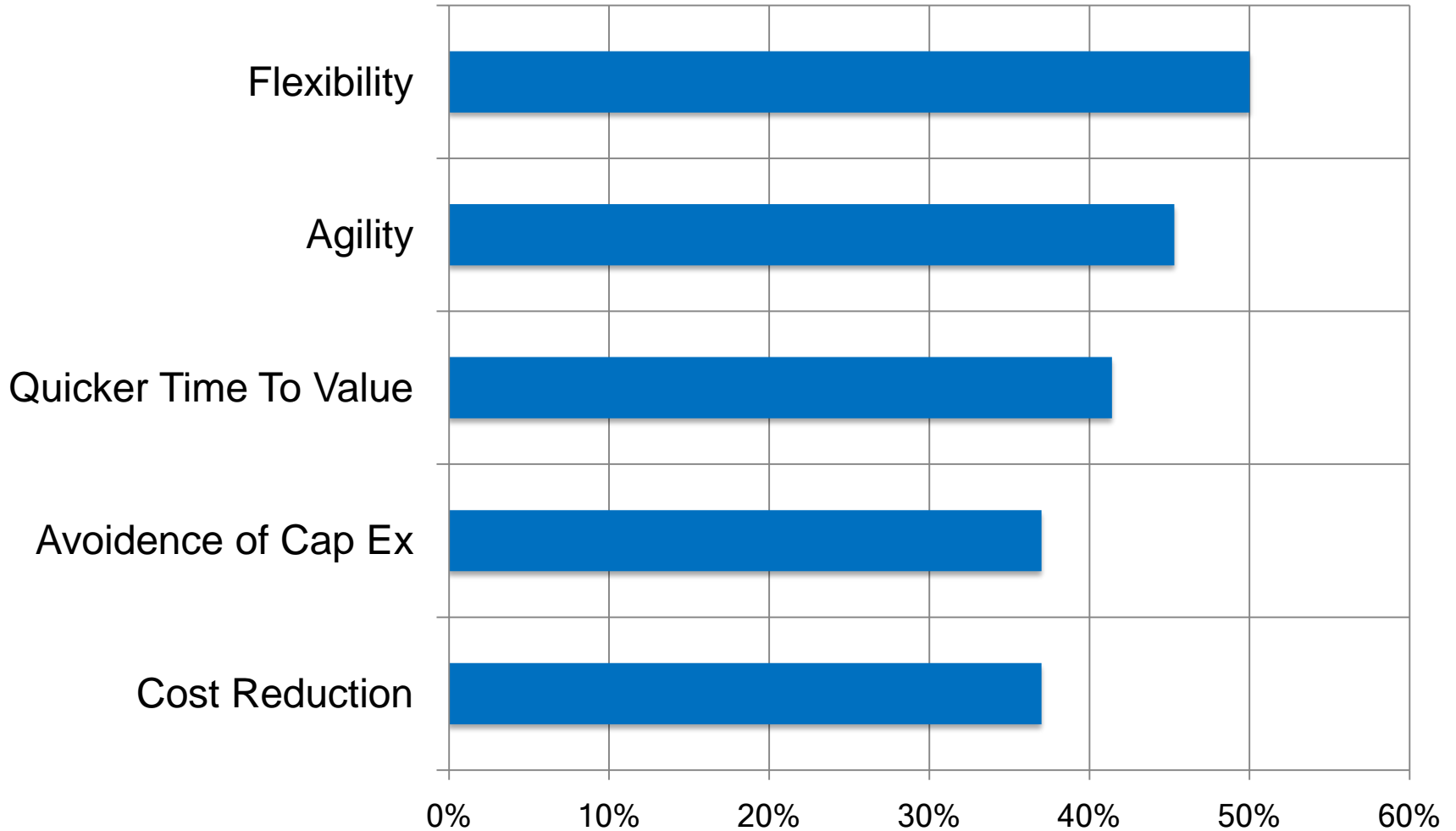


# High end enterprise use cases

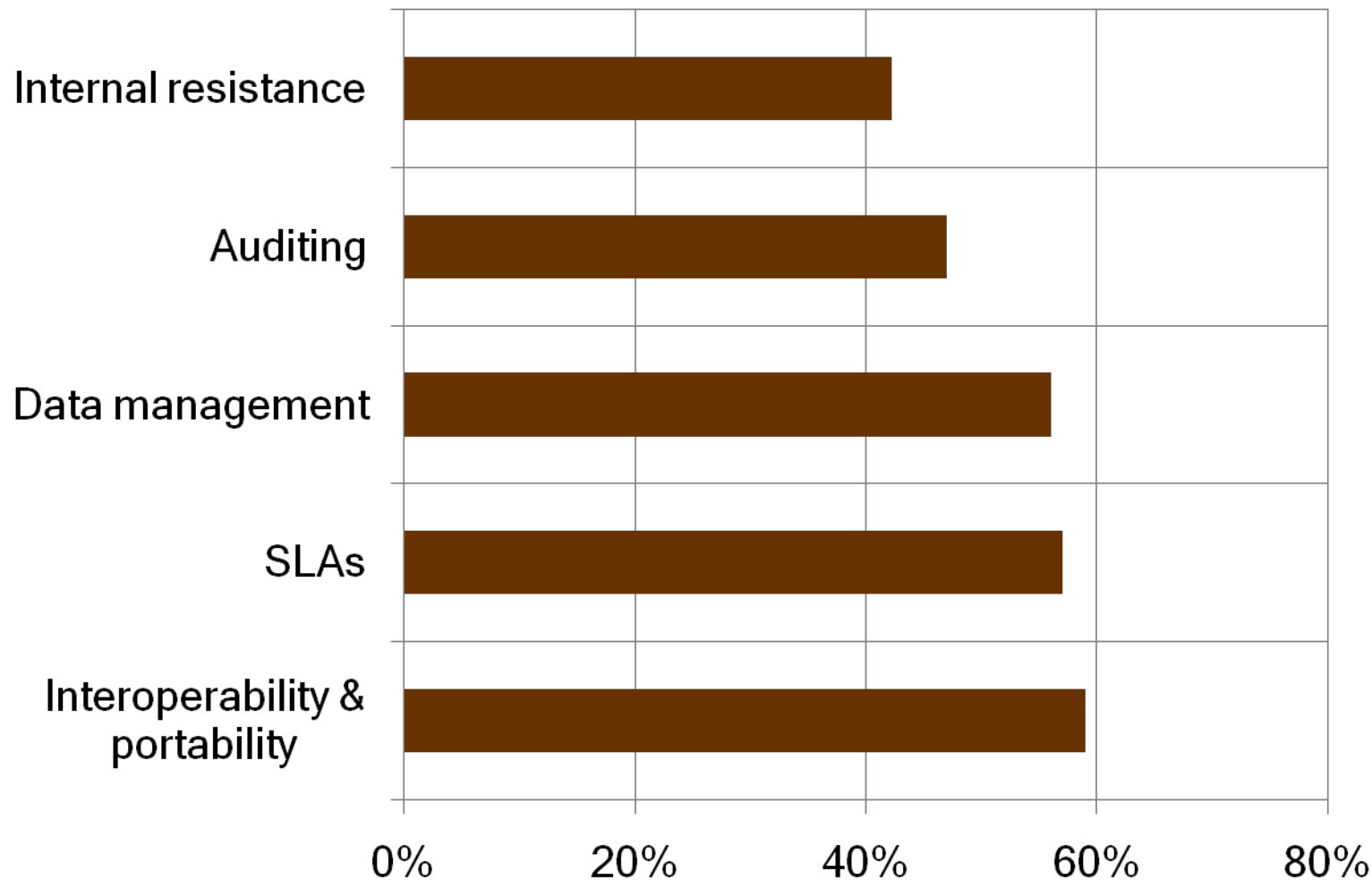
For companies with revenue exceeding \$10bn



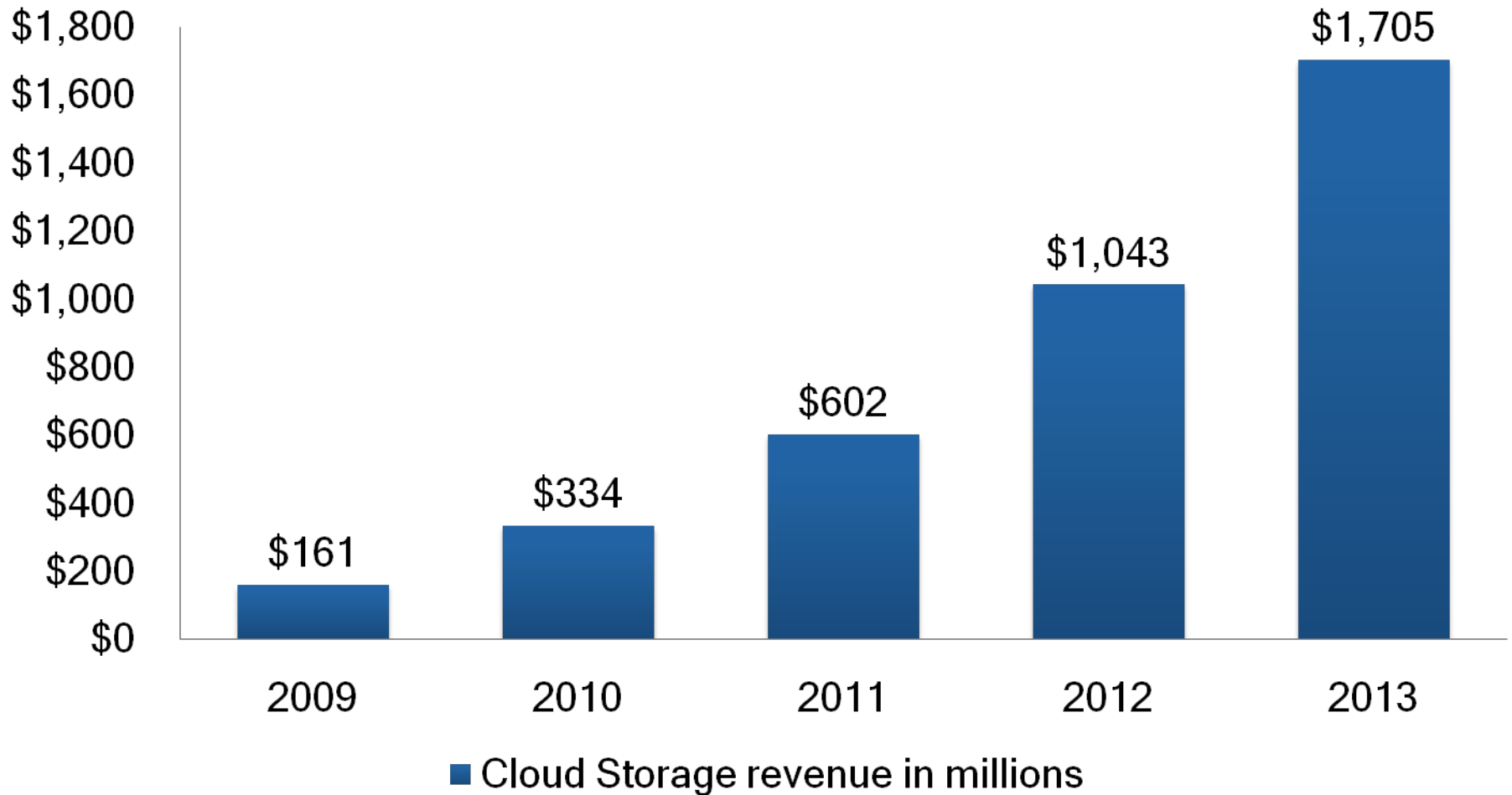
# Cloud drivers



# Leading inhibitors to cloud adoption



# Total Cloud Storage Revenue (excluding online backup)



# Where's the innovation?

## Cloud storage service

- Not seeing venture capital flowing towards creating new cloud storage startups.
- New players will not have the economy of scale to outspend giants such as Amazon, Microsoft and Google.

## Hybrid cloud storage

- Many new startups in this space.
- Startups are trying to fill gaps within existing cloud storage services.
- Attempts to blend benefits of the cloud and on-premises storage and the cloud.

# Hybrid cloud storage

On-premises cloud gateway appliance which simplifies the transfer of data from a customer site up to a storage cloud.

The offering can be sold in the form of an appliance or as a VSA (Virtual Storage Appliance), and typically look like a NAS appliance.

Added benefits typically include deduplication, caching, and the ability to speak with multiple clouds.

# Examples of hybrid cloud storage

## Bottomless NAS Gateway

- Earliest iteration of hybrid storage
- Looks and functions like a file server
- Pushes older content to cloud, keeps warm data local
- Replacement for NAS and backup

## Disaster Recovery Appliances

- Replicate data out to remote storage cloud for offsite protection
- Provide backup and bare metal restore functionality
- Have the ability to fill in for servers after an outage

## Primary Storage Replacement

- Function as a iSCSI storage target
- Identify active content and push old data out to cloud
- Replaces storage arrays

# Convergence and Consolidation



# Market Convergence: The end of best of breed?

- ❑ New offerings blend Storage, Server and Networking resources into a super silo.
- ❑ Recent acquisitions push the market towards consolidation.
- ❑ Best of breed can only happen if customers have the resources to test, implement and support new technologies.

# FCoE: ready to drive convergence?

## **Adoption has been muted to date**

- Test phase : (2010 – 2011)
- Mainstream adoption: (2012 – beyond)?

## **Limited use cases**

- Server to SAN connectivity “top-of-rack”
- Storage target connectivity

## **Technology obstacles**

- No multi-hop networking

## **Political challenges: SAN vs IP networking teams**

# **Solid State Storage: Storage Tiering and Caching**

## The Storage Performance “gap”

### **Hard drives increase capacity - without enhancing performance**

- Hard drive innovation is pushing capacities well beyond 2TB per drive
- Peak performance limited to 15,000 RPM drives

### **Solid State Storage delivers high performance - but at a high price**

- Flash SSDs excel at random read performance
- High price per GB makes them unsuitable for many environments

# The Emergence of Solid State Storage

## □ Why is it relevant?

- High Performance – especially in regards to random reads (35,000 – 185,000 read IOPS)
- Conserves power and data center real estate
- Is more resistant to vibration, compared with hard drives (Mobile and Military markets)

## □ Is MLC the key?

- Overcoming write endurance limitations
- 3X more affordable than SLC
- Enterprise ready?

# Use cases for Solid State Storage

- ❑ OLTP and Data Warehouses
- ❑ Server and Desktop virtualization
- ❑ Unstructured data cache
- ❑ Read heavy media delivery
- ❑ Hybrid Storage – blends conventional spinning disk with SSDs

# Where to deploy?

- ❑ **Server centric:** i.e. PCI-E cards
- ❑ **Storage centric:** embedded in array
- ❑ **Network centric:** i.e. bump in the wire cache

**Each deployment has strengths a weaknesses.**

## Automated Storage Tiering

Has become a popular technology in the past two years with multiple vendors embedding this feature within their storage systems.

Allows storage systems to migrate 'hot' data to high speed flash-based storage tiers, while simultaneously moving stale data to inexpensive SATA hard drives.

## Storage Caching

Primarily being driven by NetApp (i.e. Flash Cache) and a few startups, storage systems with caching use solid state storage as a memory extension technology.

Caching proponents claim that the migration required to do tiering is inefficient and reacts too slowly to eliminate hotspots.



# Challenges with storage optimization

- ❑ Many have tried, none have made it mainstream – i.e. ILM
- ❑ Why? Complexity outweighed benefit
- ❑ Solid State Storage and deduplication make optimization attractive
- ❑ Integration with storage systems

***Do customers really want the super box?***

# Storage and Server consolidation

- ❑ The driver? High powered, commodity X86 processors has compelled storage vendors to use these CPUs in place of proprietary processors.
- ❑ Storage vendors are now tapping into this CPU power to allow customers and partners to run applications on the storage systems themselves -eliminating servers in the process.
- ❑ Initial target markets include: video surveillance, archiving and data warehouses

# Questions?

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