451 Research | Uptime Institute | yankee group

2014 Flash Storage Outlook (Storage Wave 18)

Flash Memory Summit

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Nikolay is an analyst for 451 Research's TheInfoPro service, where he identifies trends, relationships and synergies within and across five key IT sectors: storage, cloud computing, information security, networking, and servers & virtualization.

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TheInfoPro Business Overview

Fundamental, "**voice of the customer**" research on key Information Technology (IT) sectors.

Since 2002, the **unbiased** alternative to Gartner. No analyst spin just direct, factual results provided to our clients.

Source: Extensive one-on-one interviews with thousands of pre-screened senior level IT professionals.

Representing a variety of verticals, majority of **Network Members' organizations** gross more $1B annually.

Focus is IT Infrastructure spanning: Storage, Servers, Networking, Information Security, and Cloud Computing.

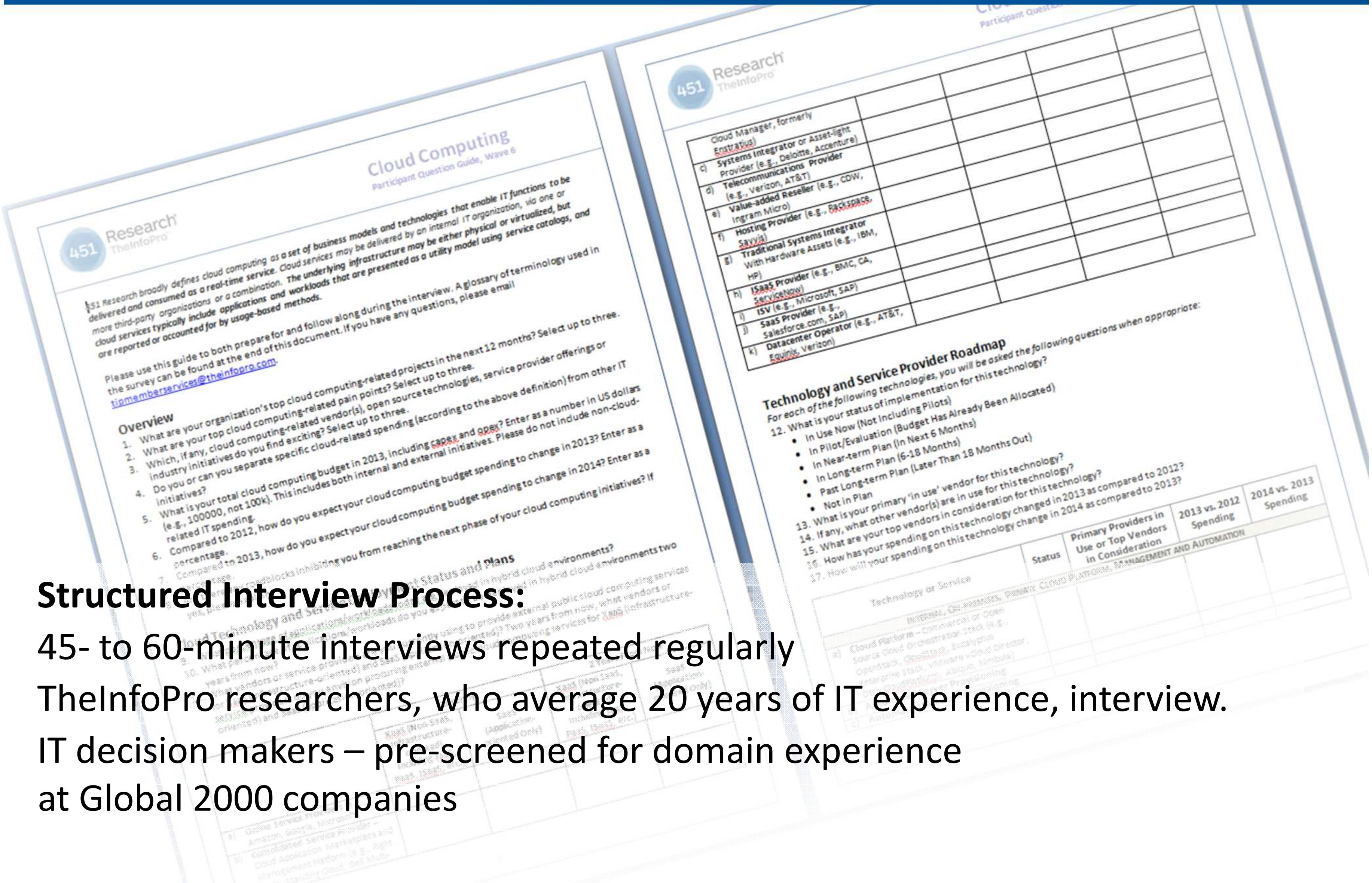
Quantitative and qualitative data includes: customer spending, vendor shortlists, vendor performance and technology roadmaps.

TIPNetwork: IT Professionals Representing over $23 bn in Buying Power
Rely on TIP Data for Peer Benchmarking and Vendor Selection

"The TIP*Network has been an invaluable source for Verizon to understand where we are compared to the industry as it relates to technology adoption and how the vendors we use or are considering, perform in the marketplace. It is the only source today for us to get true peer comparison data."*

Kevin Shine, VP of Information Technology

TheInfoPro Interview Process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Cloud Computing
Participant Question Guide, Wave 6

451 Research broadly defines cloud computing as a set of business models and technologies that enable IT functions to be delivered and consumed as a real-time service. Cloud services may be delivered by an internal IT organization, via one or more third-party organizations or a combination. The underlying infrastructure may be either physical or virtualized, but cloud services typically include applications and workloads that are presented as a utility model using service catalogs, and are reported or accounted for by usage-based methods.

Please use this guide to both prepare for and follow along during the interview. A glossary of terminology used in the survey can be found at the end of this document. If you have any questions, please email tipmemberservices@theinfopro.com.

Overview
1. What are your organization's top cloud computing-related projects in the next 12 months? Select up to three.
2. What are your top cloud computing-related pain points? Select up to three.
3. Which, if any, cloud computing-related vendor(s), open source technologies, service provider offerings or industry initiatives do you find exciting? Select up to three.
4. Do you or can you separate specific cloud-related spending (according to the above definition) from other IT initiatives?
5. What is your total cloud computing budget in 2013, including capex and opex? Enter as a number in US dollars (e.g., 100000, not 100k). This includes both internal and external initiatives. Please do not include non-cloud-related IT spending.
6. Compared to 2012, how do you expect your cloud computing budget spending to change in 2013? Enter as a percentage.
7. Compared to 2013, how do you expect your cloud computing budget spending to change in 2014? Enter as a percentage.

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	Cloud Manager, formerly Enstratius)
c)	Systems Integrator or Asset-light Provider (e.g., Deloitte, Accenture)
d)	Telecommunications Provider (e.g., Verizon, AT&T)
e)	Value-added Reseller (e.g., CDW, Ingram Micro)
f)	Hosting Provider (e.g., Rackspace, Savvis)
g)	Traditional Systems Integrator with Hardware Assets (e.g., IBM, HP)
h)	ISaaS Provider (e.g., BMC, CA, ServiceNow)
i)	ISV (e.g., Microsoft, SAP)
j)	SaaS Provider (e.g., Salesforce.com, SAP)
k)	Datacenter Operator (e.g., AT&T, Equinix, Verizon)

Technology and Service Provider Roadmap
For each of the following technologies, you will be asked the following questions when appropriate:
12. What is your status of implementation for this technology?
- In Use Now (Not Including Pilots)
- In Pilot/Evaluation (Budget Has Already Been Allocated)
- In Near-term Plan (In Next 6 Months)
- In Long-term Plan (6-18 Months)
- Past Long-term Plan (Later Than 18 Months Out)
- Not in Plan
13. What is your primary 'in use' vendor for this technology?
14. If any, what other vendor(s) are in use for this technology?
15. What are your top vendors in consideration for this technology?
16. How has your spending on this technology changed in 2013 as compared to 2012?
17. How will your spending on this technology change in 2014 as compared to 2013?

Technology or Service	Status	Primary Providers in Use or Top Vendors in Consideration	2013 vs. 2012 Spending	2014 vs. 2013 Spending

Structured Interview Process:

45- to 60-minute interviews repeated regularly

TheInfoPro researchers, who average 20 years of IT experience, interview.

IT decision makers – pre-screened for domain experience

at Global 2000 companies

One-on-One Interview Process:
Core Intelligence Captured

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Company Profile

- Overall Budgets & Changes
- Pain Points
- Exciting Vendors
- Top Projects

Technology Roadmap

- Status
- Vendor
- $ Trend
- $ Spend

Vendor Performance

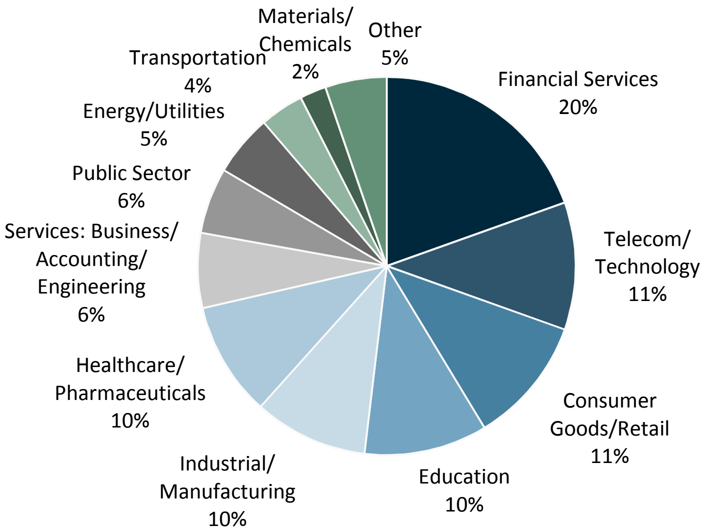
- Forward Looking Spending Data
- Vulnerability
- Ratings

Timely Topics

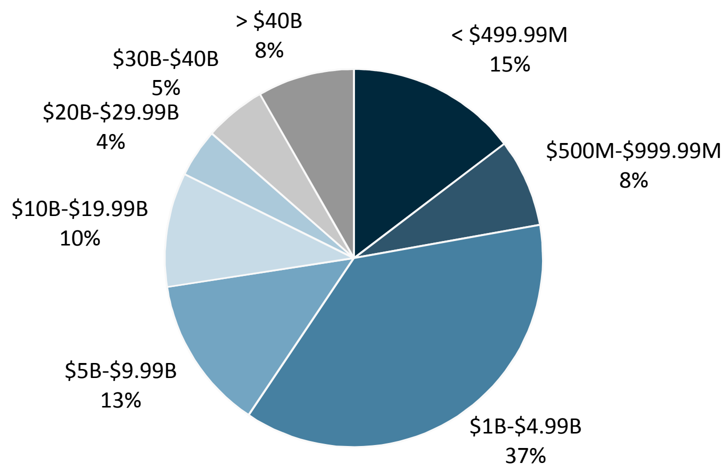
- Rank the Importance
- Motivators & Inhibitors
- Organizational Dynamics

Demographics

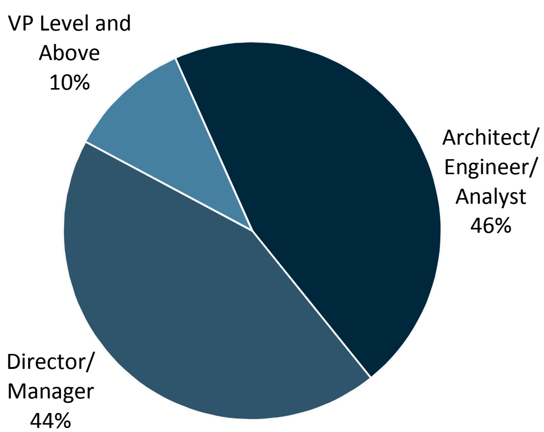
Industry Verticals



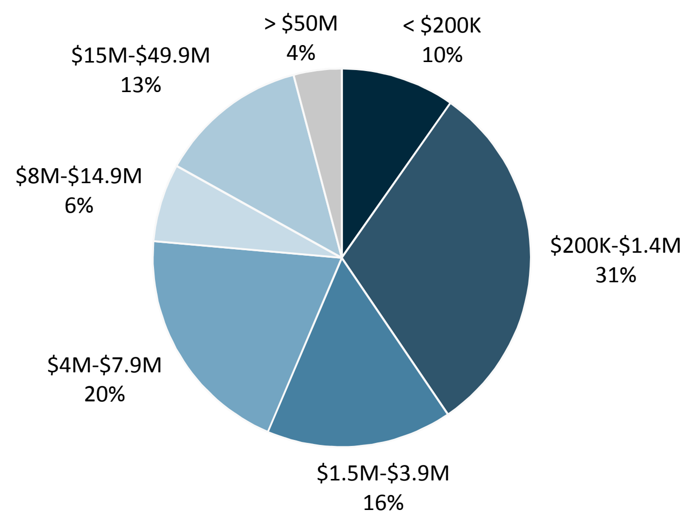
Enterprise Revenue



Respondent's Title

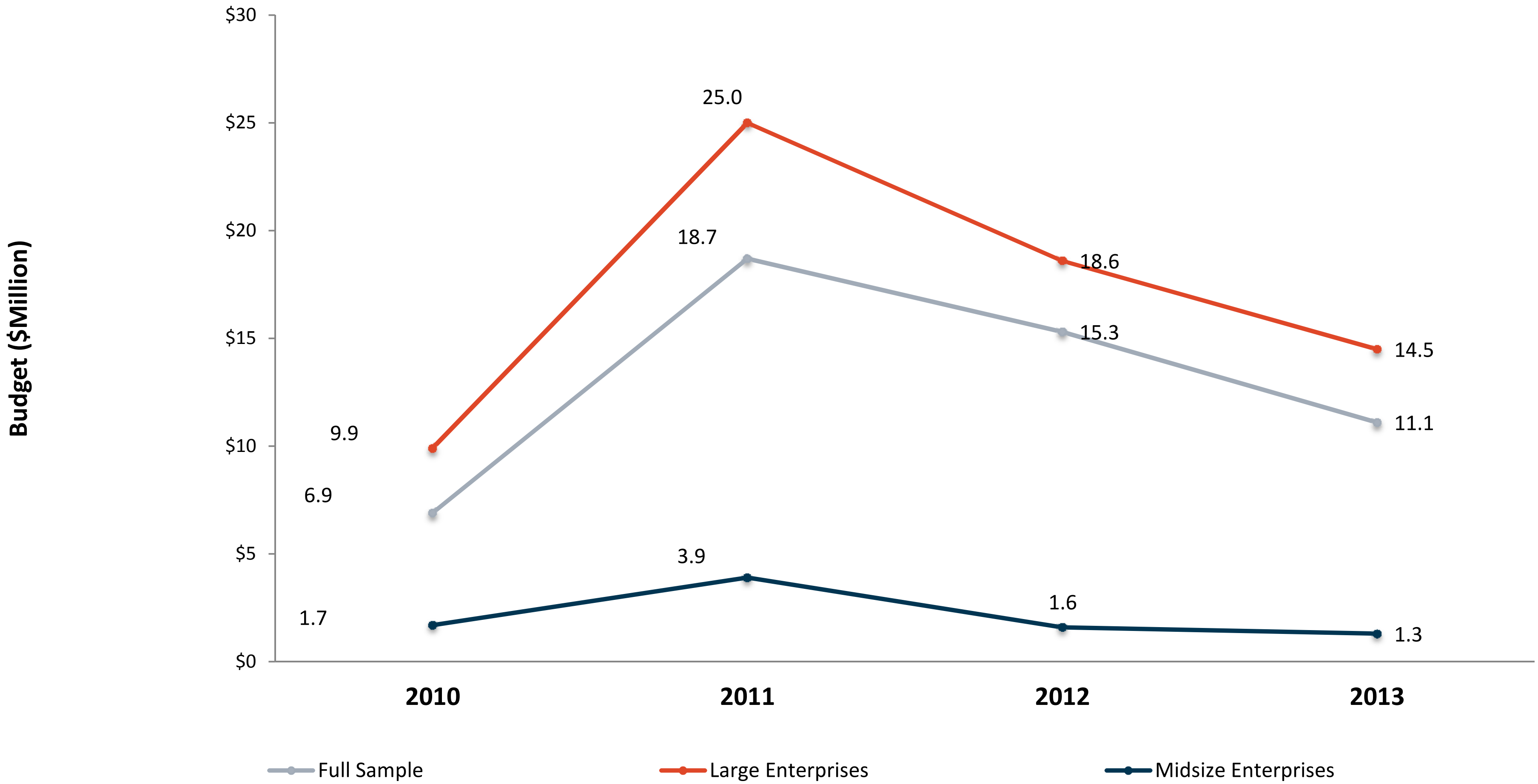


Storage Budget Level



Current Situation

Mean Storage Budget: 2011-2013 by Size of Enterprise



"Seeing large demand without an expanding budget." – LE, Financial Services

"We expect a flat storage budget going forward because of the increased storage technology options like thin provisioning." – LE, Healthcare/Pharmaceuticals

Full Sample: 2010, n=201; 2011, n=194; 2012, n=196; 2013, n=195. Large Enterprise Sample: 2010, n=128; 2011, n=136; 2012, n=158; 2013, n=146. Midsize Enterprise Sample: 2010, n=73; 2011, n=58; 2012, n=38; 2013, n=49.

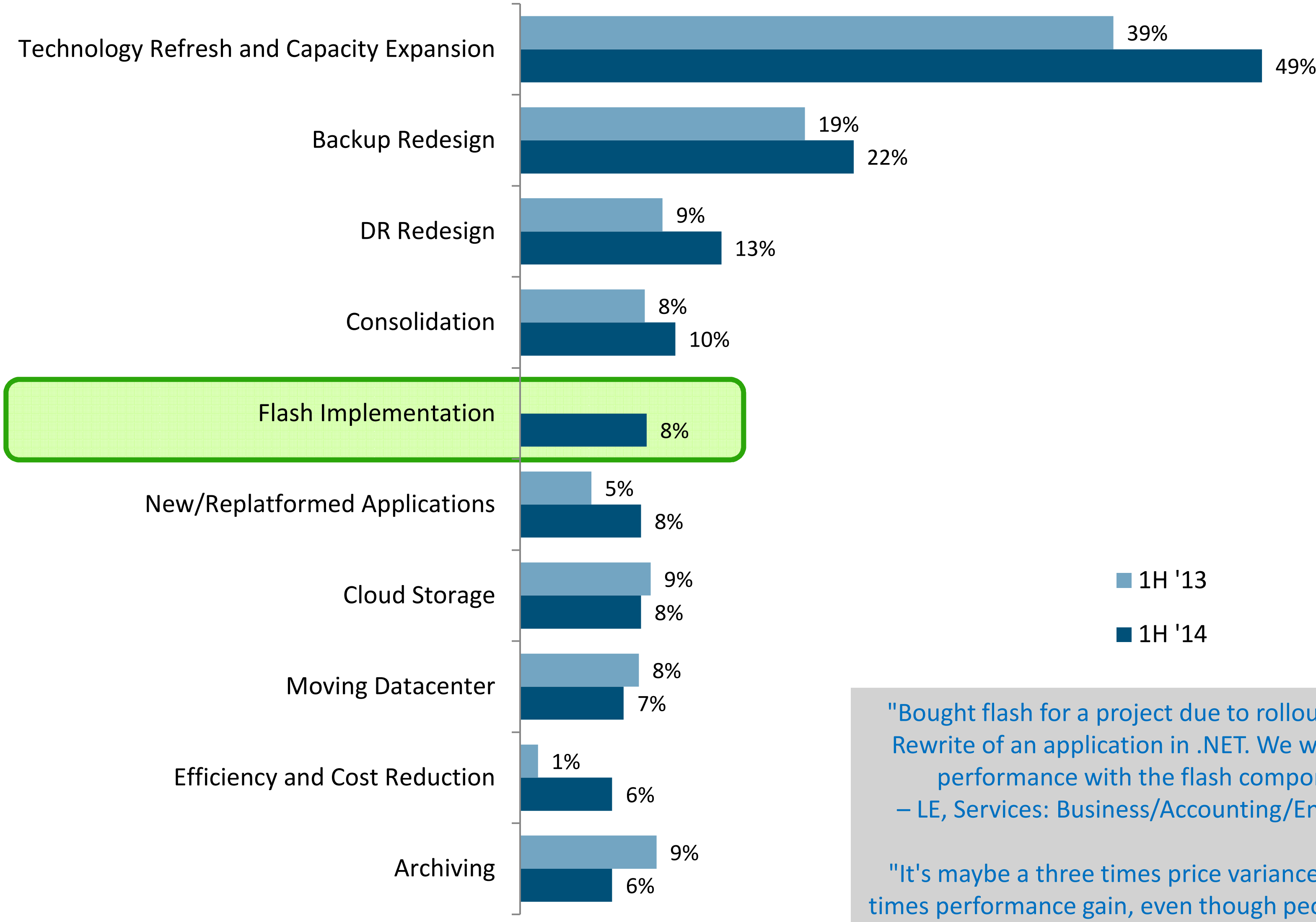
Comparing Storage to IT Budgets by Industry Vertical

Industry	% of Storage in IT Budgets
	Mean (1H 2014)
Energy/Utilities	27%
Healthcare/Pharmaceuticals	16%
Financial Services	15%
Education	14%
Consumer Goods/Retail	13%
Services: Business/Accounting/Engineering	12%
Industrial/Manufacturing	12%
Public Sector	12%
Telecom/Technology	12%
Transportation	10%
Materials/Chemicals	4%
Other	15%
Total Sample	**13.5%**

"The business wants us to have a flat IT budget. Limited or no capital spending due to outsourced facility and operations."
– LE, Industrial/Manufacturing

Q. What is your 2013 overall IT budget? What is your total storage budget in 2013, including both capex and opex?
Energy/Utilities, n=5; Healthcare/Pharmaceuticals, n=16; Financial Services, n=36; Education, n=19; Consumer Goods/Retail, n=11; Services: Business/Accounting/Engineering, n=12; Industrial/Manufacturing, n=16; Public Sector, n=9; Telecom/Technology, n=14; Transportation, n=7; Materials/Chemicals, n=4; Other, n=9.

Storage Projects – Time Series of Top Categories

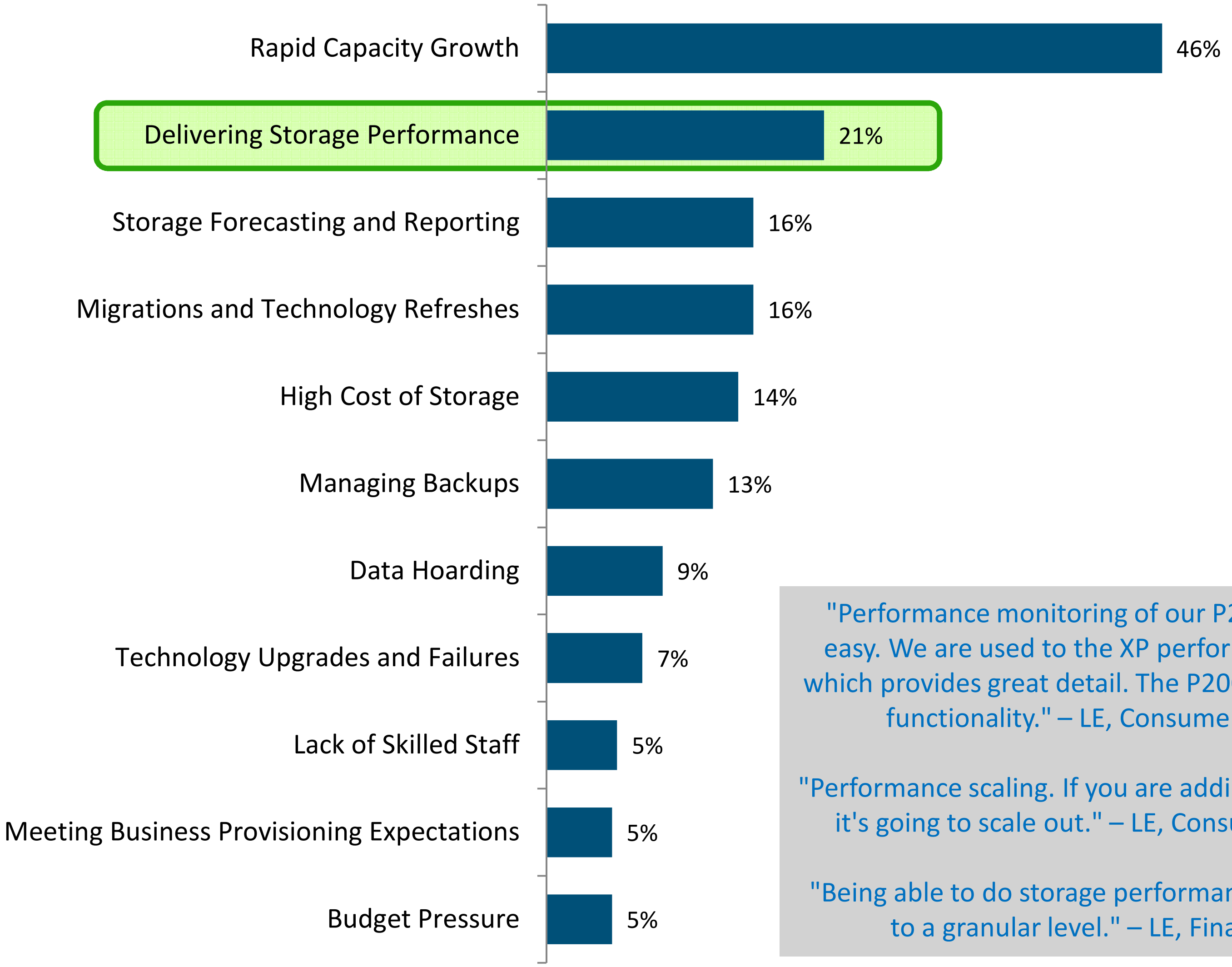


"Bought flash for a project due to rollout this year. Rewrite of an application in .NET. We want better performance with the flash component."
– LE, Services: Business/Accounting/Engineering

"It's maybe a three times price variance, but a ten times performance gain, even though people say that it's more expensive."
– LE, Transportation

Q. What are your organization's top storage-related projects in the next 12 months? List up to three. 1H '13, n=254; 1H '14, n=262.

Storage Pain Points



"Performance monitoring of our P2000 arrays. It's not easy. We are used to the XP performance advisor tool, which provides great detail. The P2000 has command line functionality." – LE, Consumer Goods/Retail

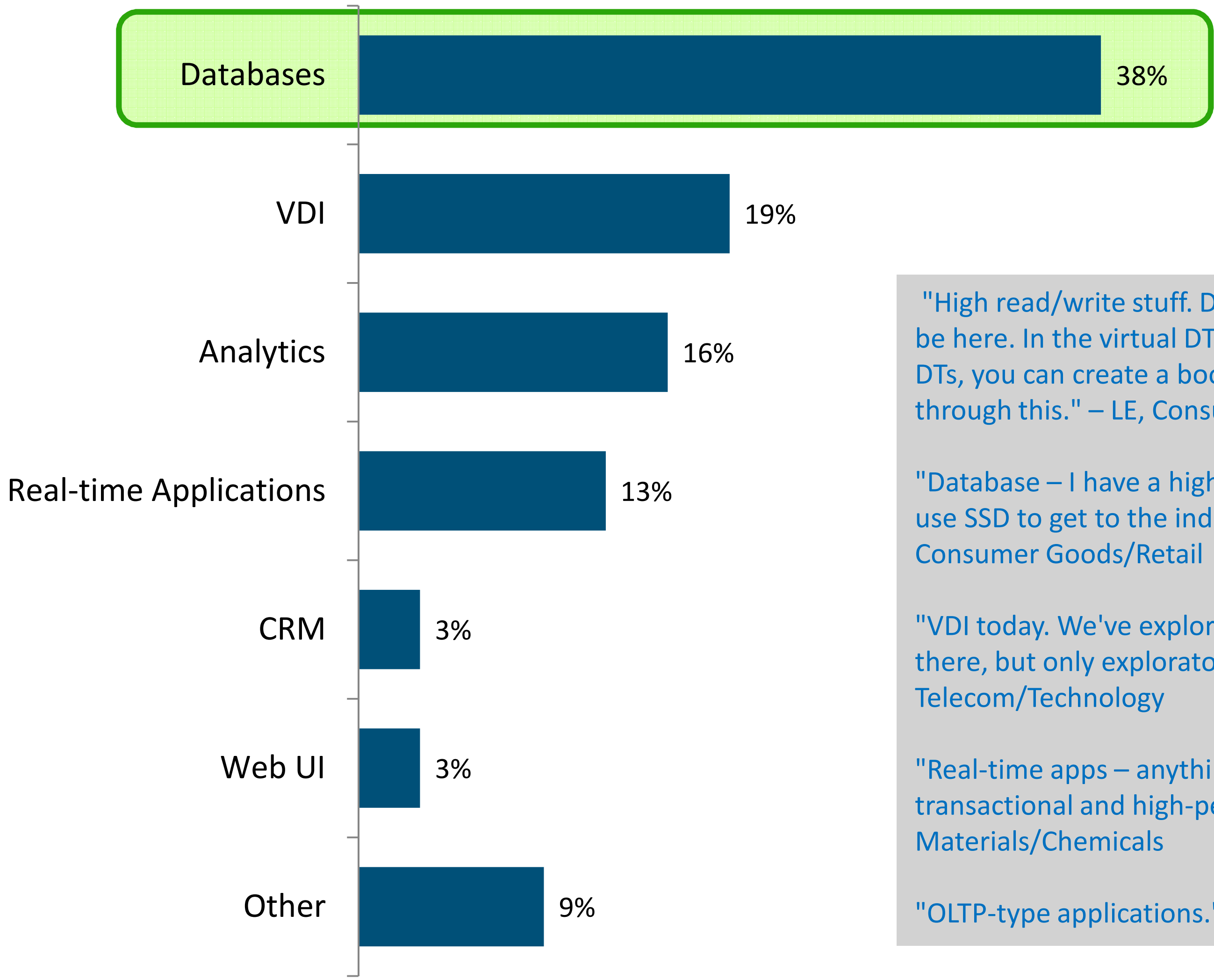
"Performance scaling. If you are adding more storage, how it's going to scale out." – LE, Consumer Goods/Retail

"Being able to do storage performance monitoring down to a granular level." – LE, Financial Services

Q. What are your top storage pain points? List up to three. n=264.

Uses

Applications Being Moved to Flash – Excluding Autotiering



"High read/write stuff. Data warehouse and analytics will be here. In the virtual DT world, if you use non-persistent DTs, you can create a boot-storm. Flash can help you get through this." – LE, Consumer Goods/Retail

"Database – I have a high I/O need for certain apps, and I use SSD to get to the indexes of those databases." – LE, Consumer Goods/Retail

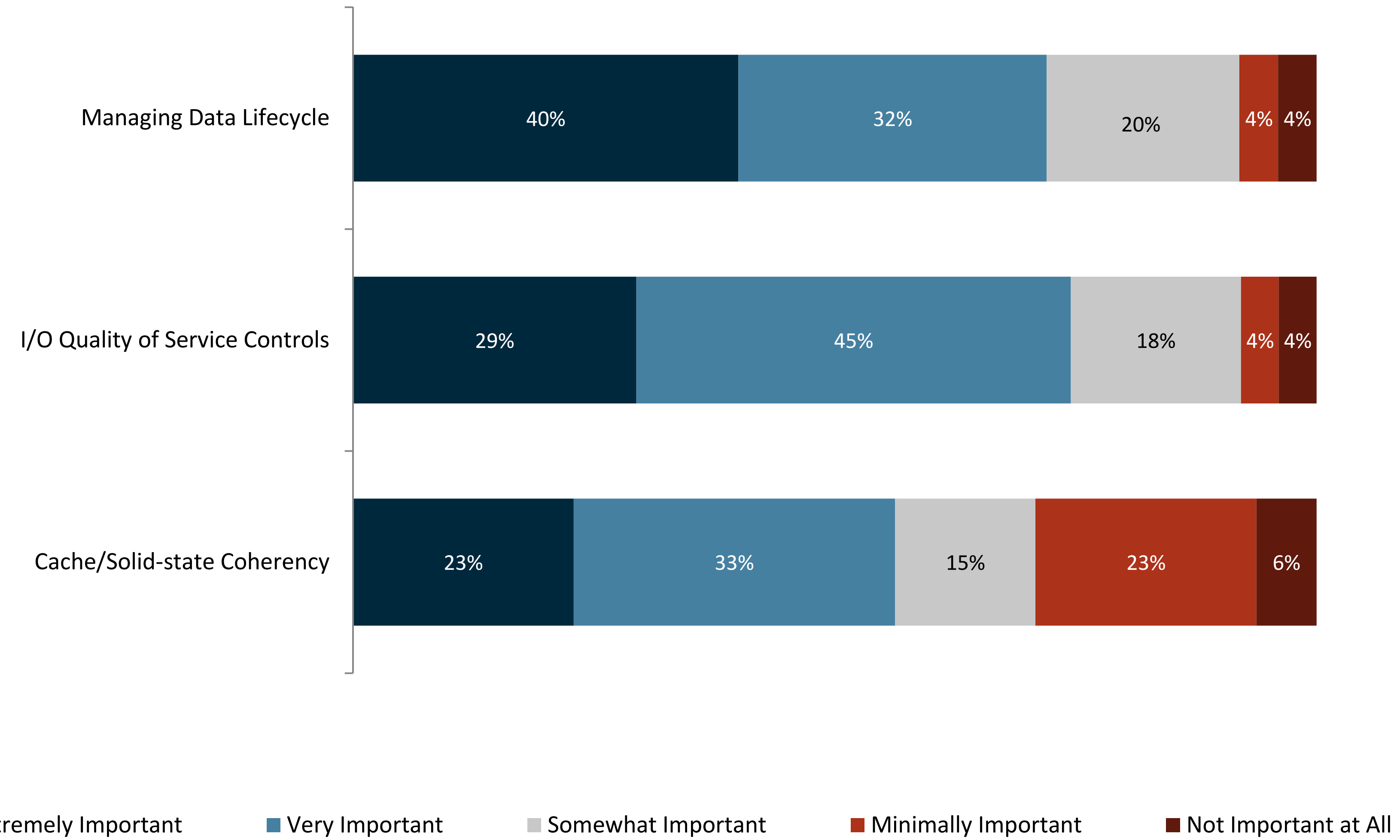
"VDI today. We've explored putting some of our SAP on there, but only exploratory today." – LE, Telecom/Technology

"Real-time apps – anything SQL-based, ERP, purchasing, transactional and high-performance apps." – LE, Materials/Chemicals

"OLTP-type applications." – LE, Industrial/Manufacturing

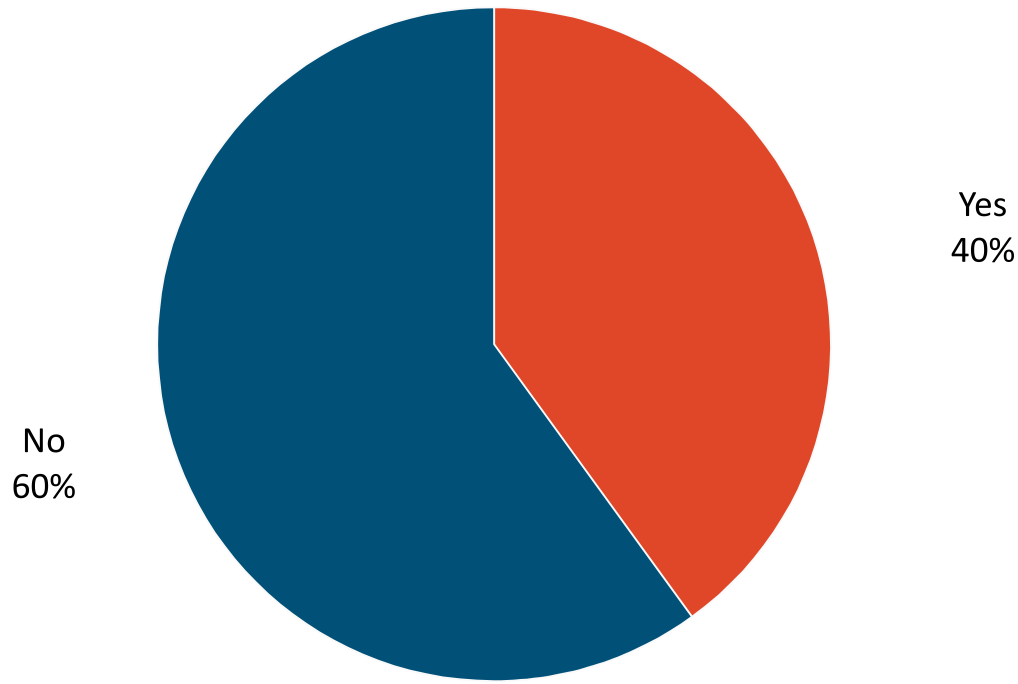
Q. Which category applications are being moved onto flash today? n=43.

Features for Solid State/Flash Storage
QoS leads, server-to-array lifecycle close second



Q. How important is the ability to manage the data lifecycle across flash in your servers and the storage (flash and disk) in your shared network storage so they are utilized effectively? Please use a 1-5 scale where '1' is not at all important and '5' is extremely important. n=50. Q. How important is having I/O quality of service controls for storage workloads? Please use a 1-5 scale where '1' is not at all important and '5' is extremely important. n=51. Q. How important is cache/solid-state coherency across multiple servers? Please use a 1-5 scale where '1' is not at all important and '5' is extremely important. n=48.

Usage of Server Flash Drives With Caching Software

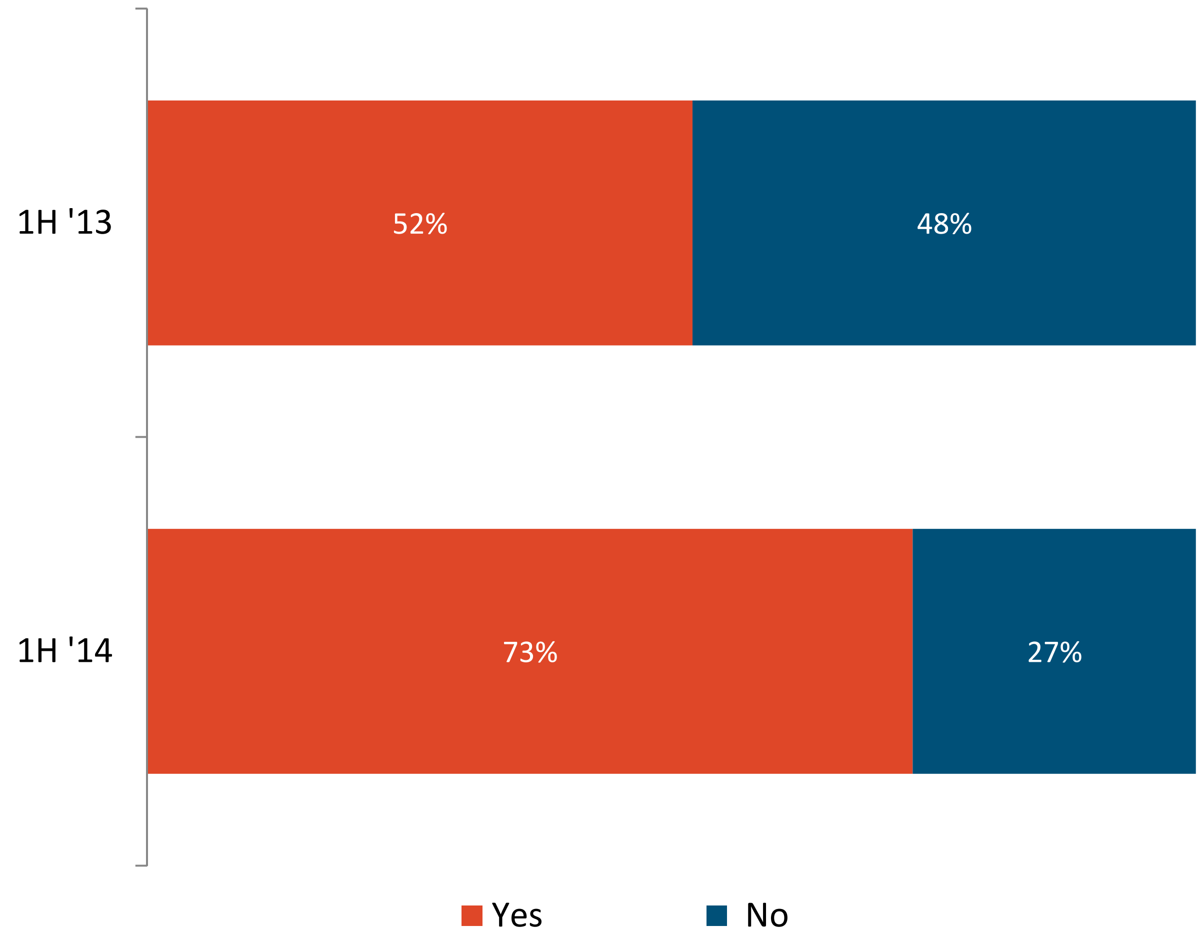


"Using server flash drives with caching software, no, that would be an additional expense."
– LE, Education

"This is interesting – just started throwing local flash into servers. Caching software is in plan – have looked at two vendors."
– LE, Energy/Utilities

Q. If you answered 'in use' for flash in servers, are you using server flash drives with caching software? n=55.

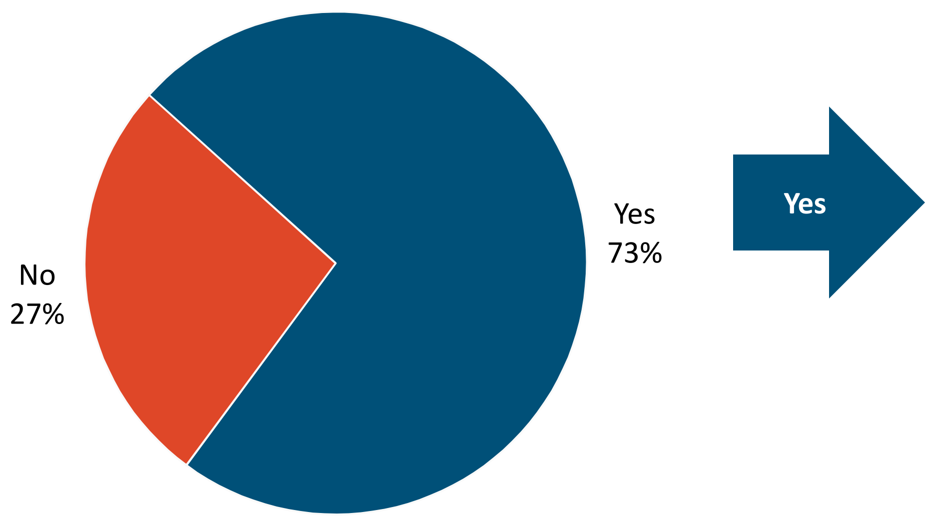
IOPS or Other I/O Performance Requirement – Time Series



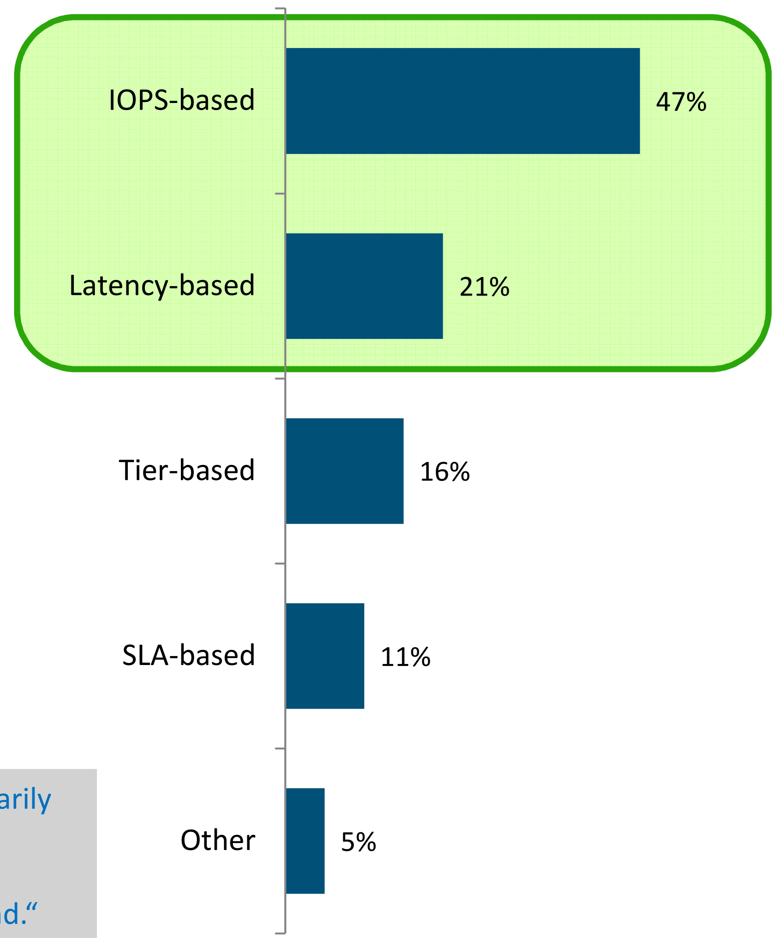
Q. Do you have a specific IOPS or other I/O performance requirement for certain applications? 1H'13 n=25; 1H'14 n=49.

IOPS or Other I/O Performance Requirement
Focus on IOPS makes server-side flash less critical

Performance Requirement



Types of Performance Requirement

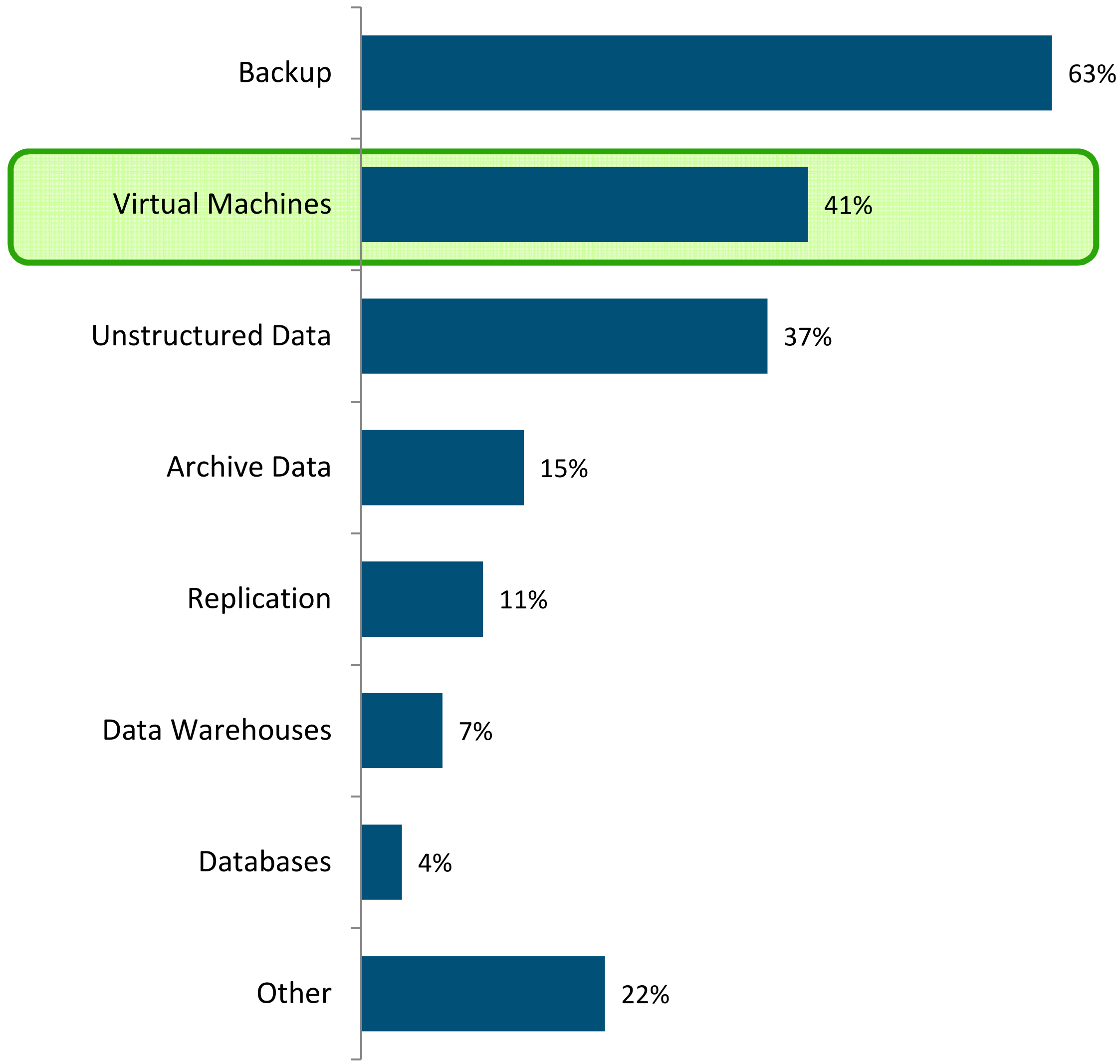


"IOPS and performance concerns – we have available storage but not necessarily available performance." – LE, Public Sector

"In terms of latency, business expects microsecond response, not millisecond." – LE, Financial Services

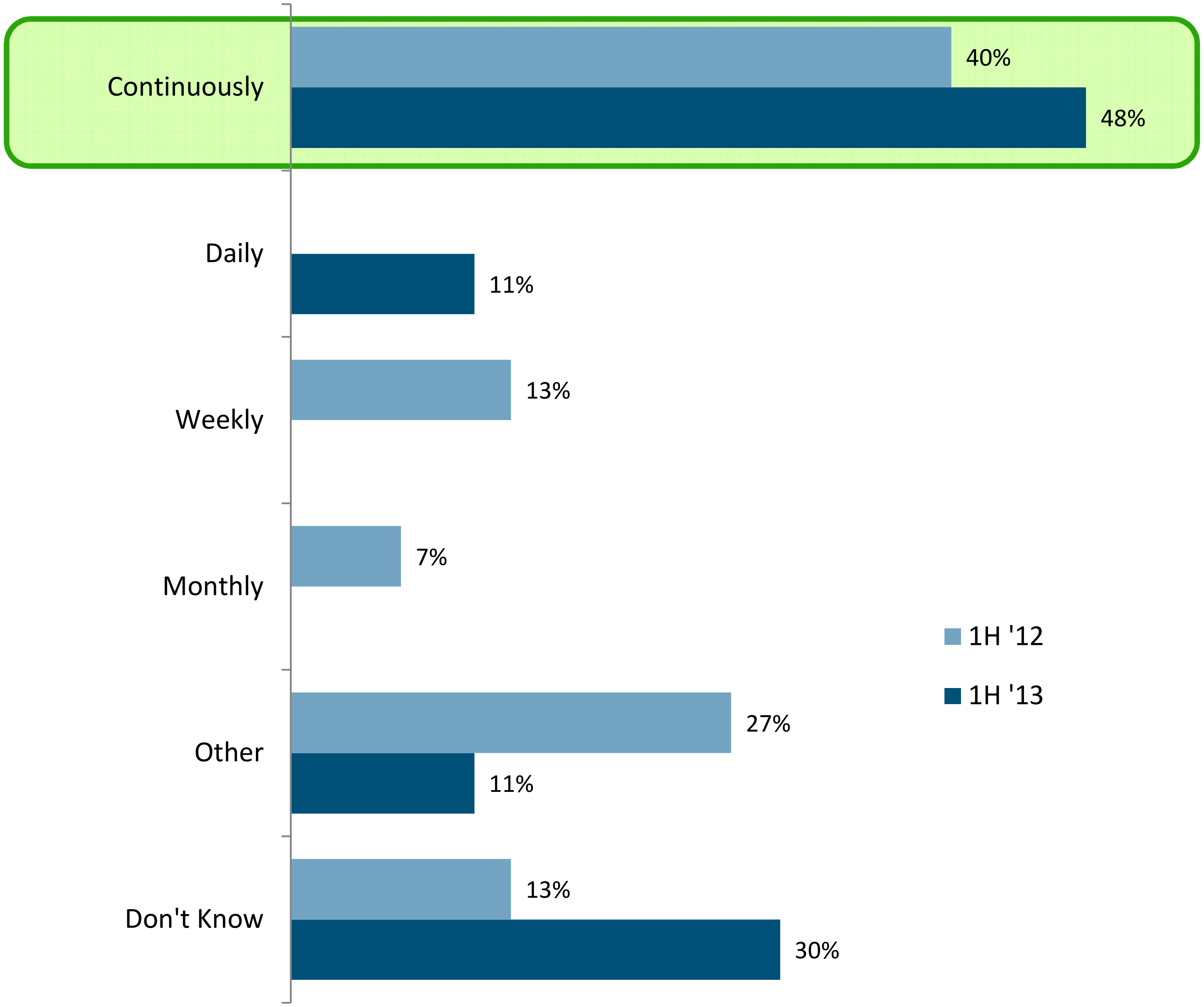
Left Chart: Q. Do you have a specific IOPS or other I/O performance requirement for certain applications? n=49. Right Chart: Q. If yes, please describe. n=19.

Production Applications Receiving Deduplication



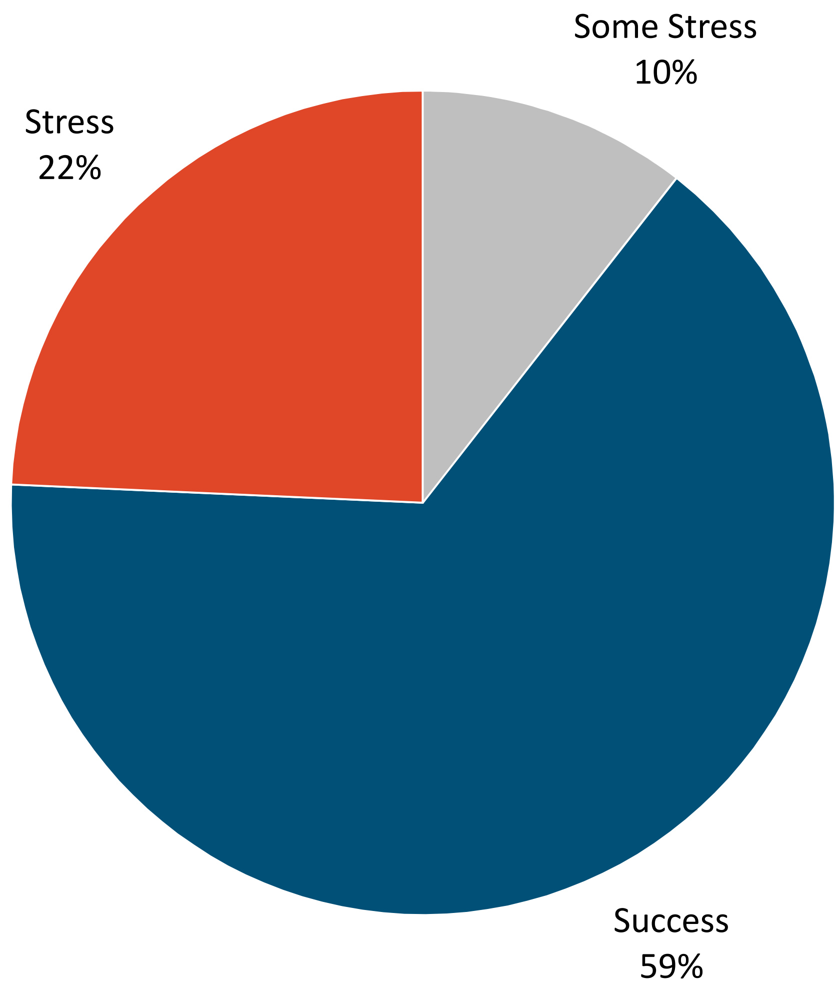
Q. What production applications are you applying de-duplication to?*

Moving Data On and Off SSD Targets



Q. Approximately how often are you moving data on and off SSD targets? 1H' 12, n=15;
1H '13, n=27.

Success/Stress of Automated Tiering Deployment

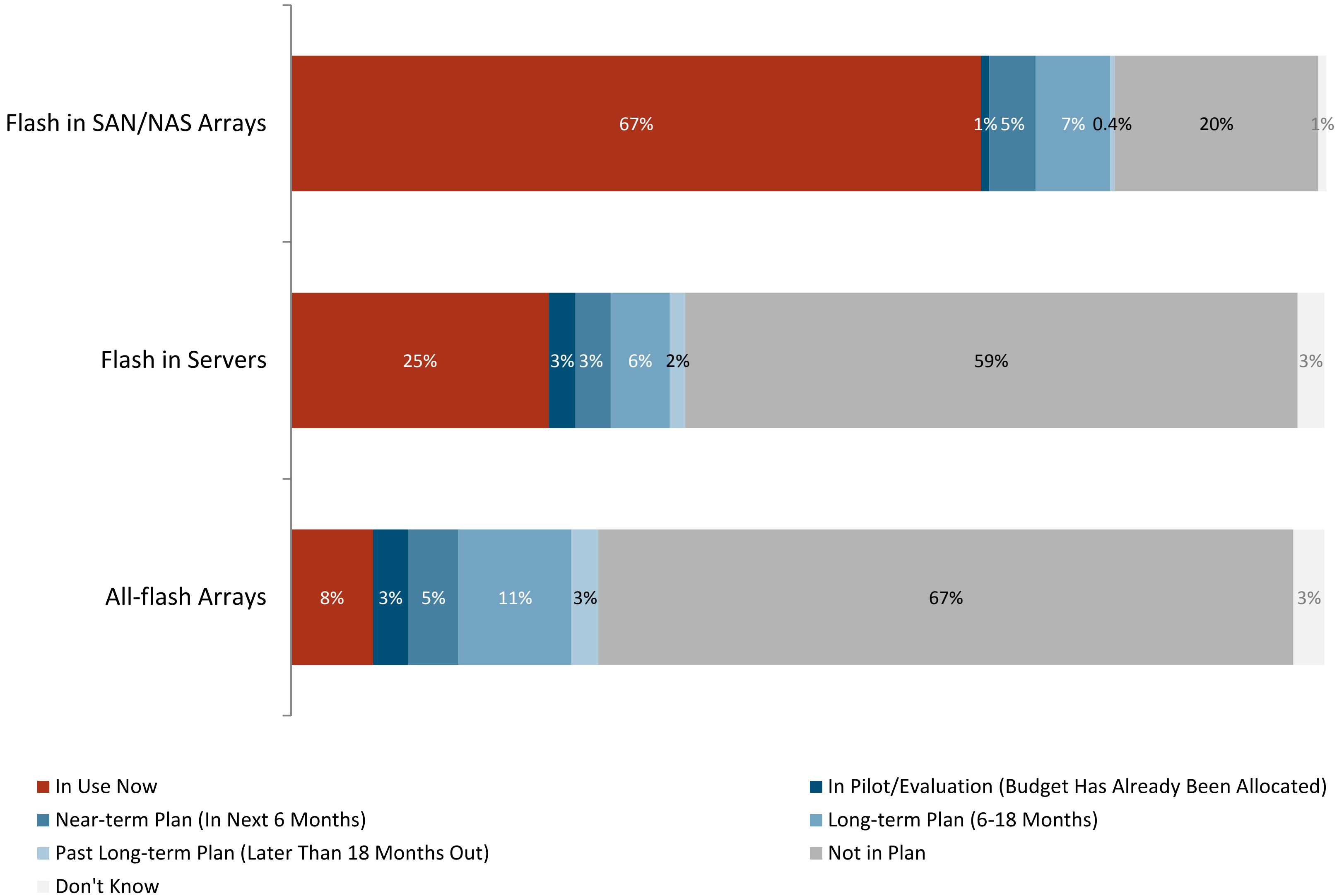


"Autotiering has worked out well as far as flexibility – moving things around and such. Stress is the management side. Deployment was pretty easy. The management side is like a Rubik's Cube. If you add SATA space, the system makes its best use. It's hard to figure out how to add capacity and know what the impact will be on other capacity." – LE, Industrial/Manufacturing

Q. If you answered 'in use' for automated tiering, describe the success or stress of the deployment. n=112.

Vendors

Flash Storage Technology Roadmap

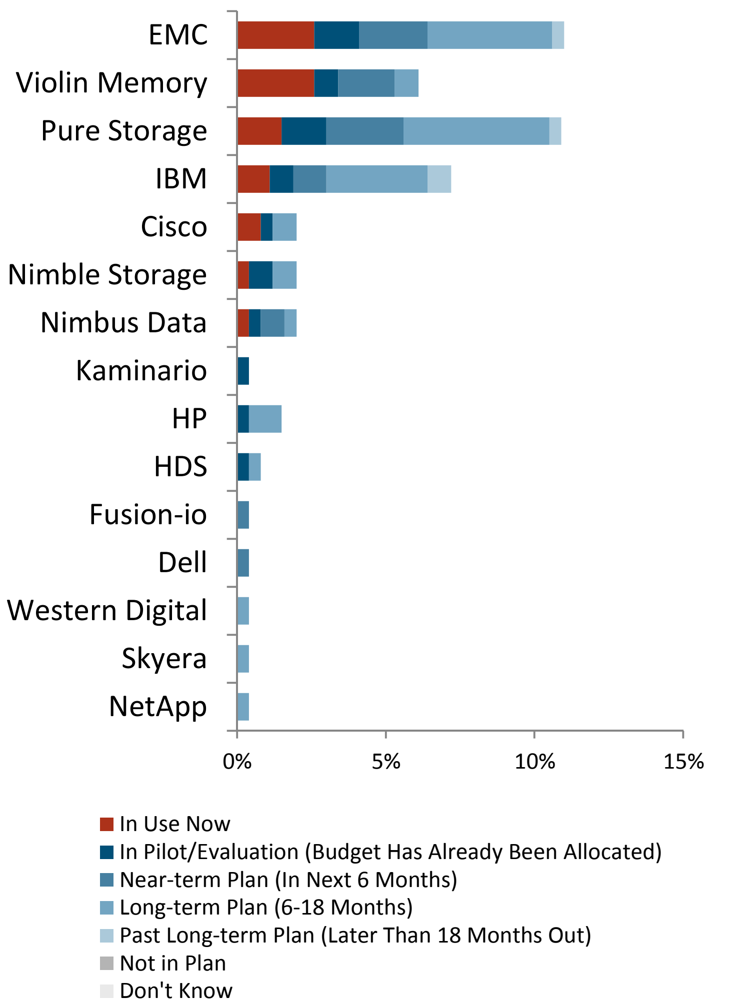


Q. What is your status of implementation for this technology? n=264 to 265.

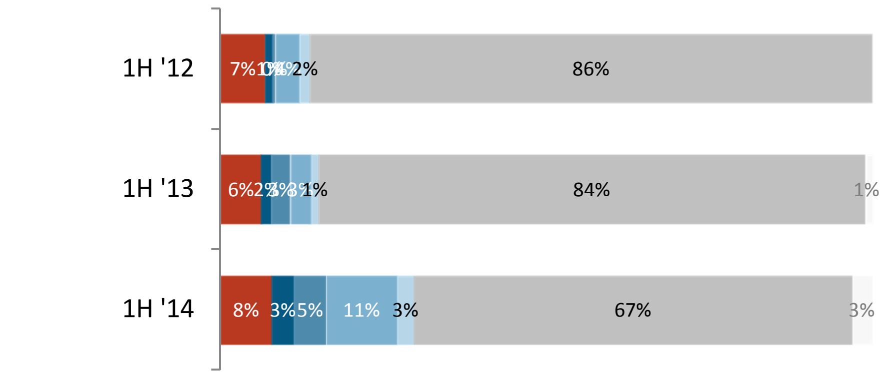
All-flash Arrays

Storage
Heat Index Rank: 1

Vendor Implementation



Implementation Roadmap

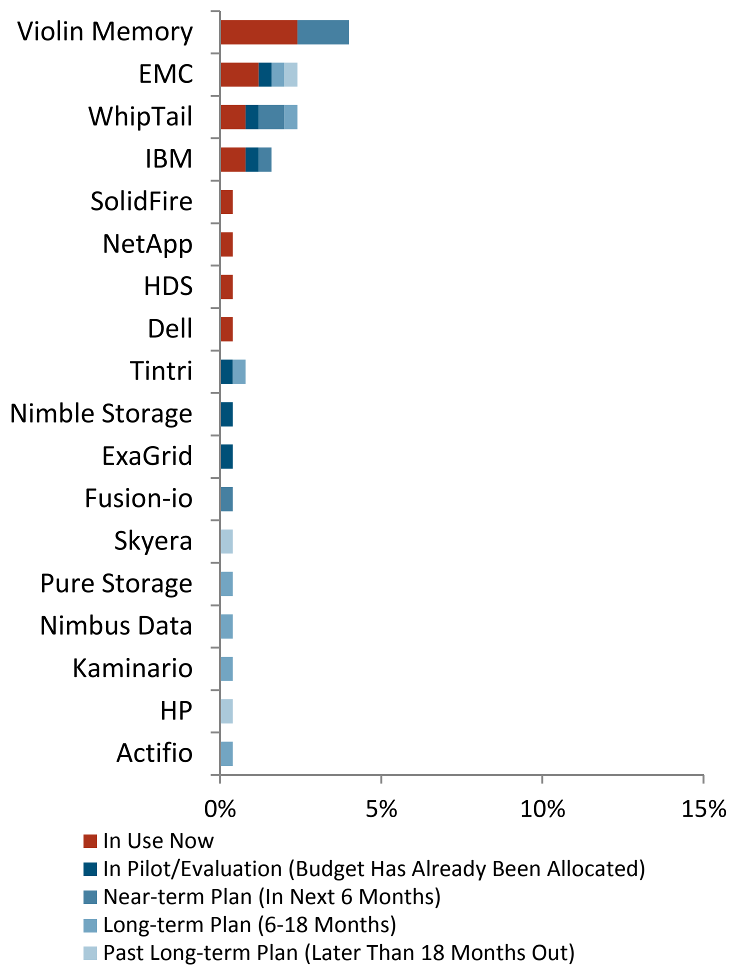


Spending Change

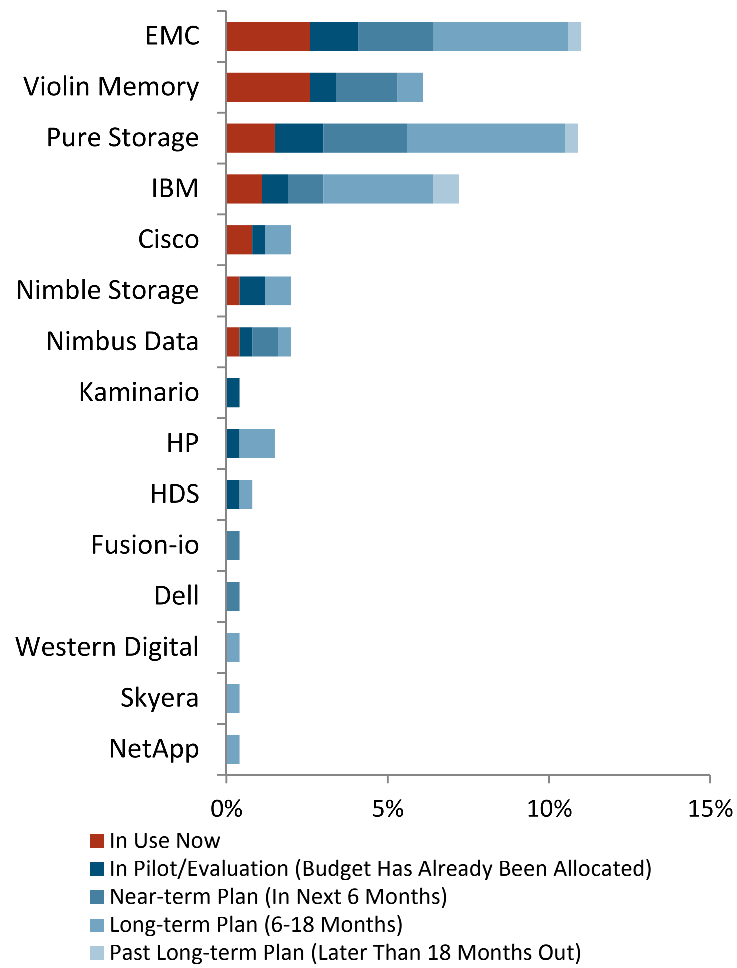
Left Chart, n=265. Top Right Chart: 1H '12, n=245; 1H '13, n=252; 1H '14, n=265. Bottom Right Chart: 2014 vs. 2013, n=264; 2015 vs. 2014, n=264. The 'implementation' charts use the same legend.

All-flash Arrays – Time Series

1H '13



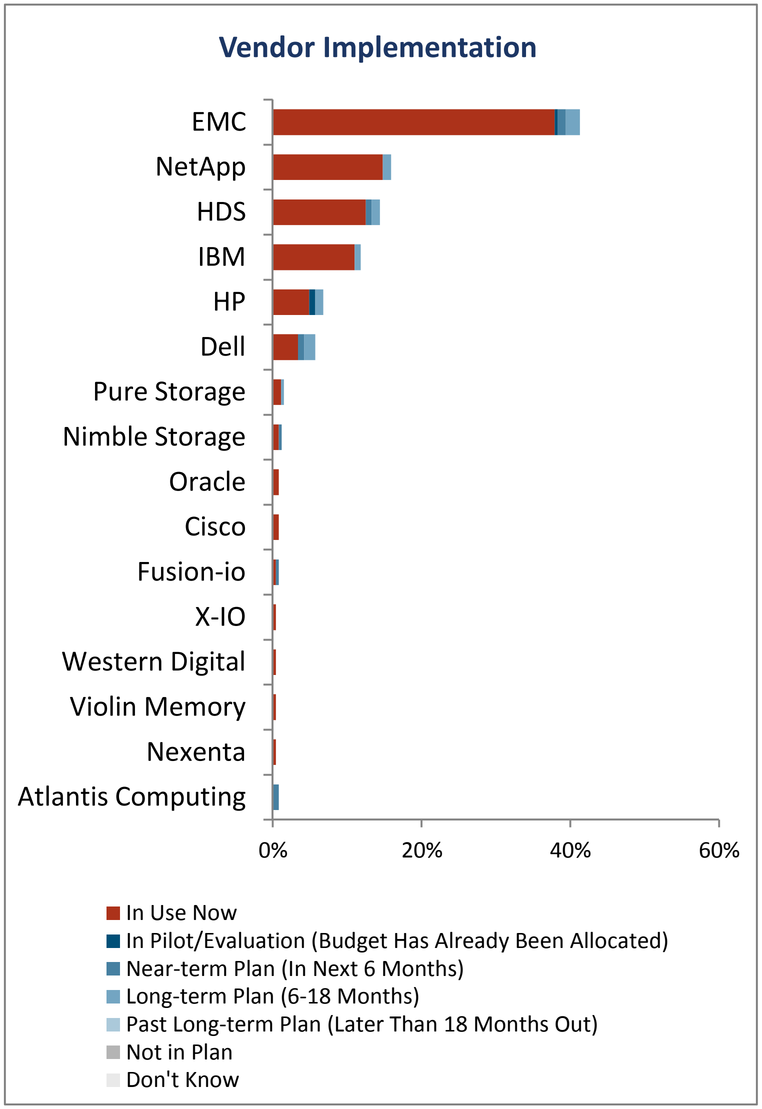
1H '14

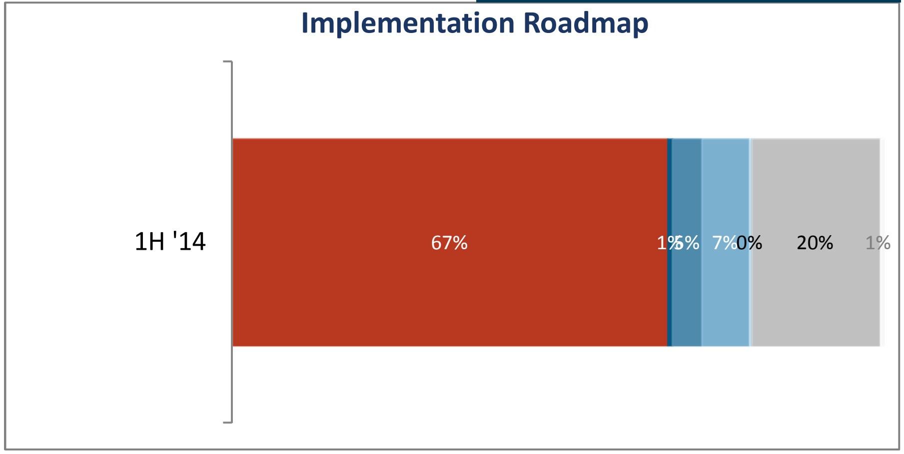


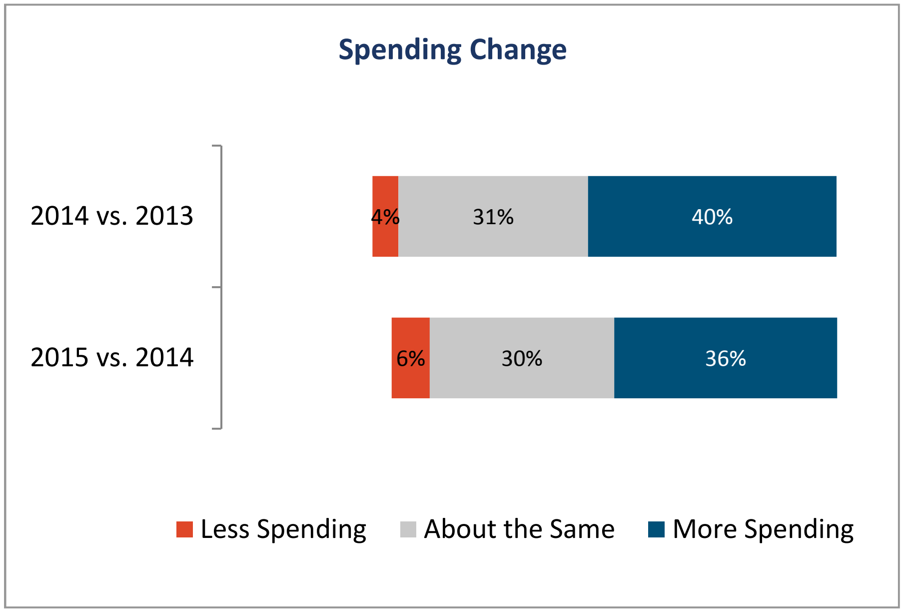
1H '13, n=252; 1H '14, n=265.

Flash in SAN/NAS Arrays

Storage
Heat Index Rank: 3



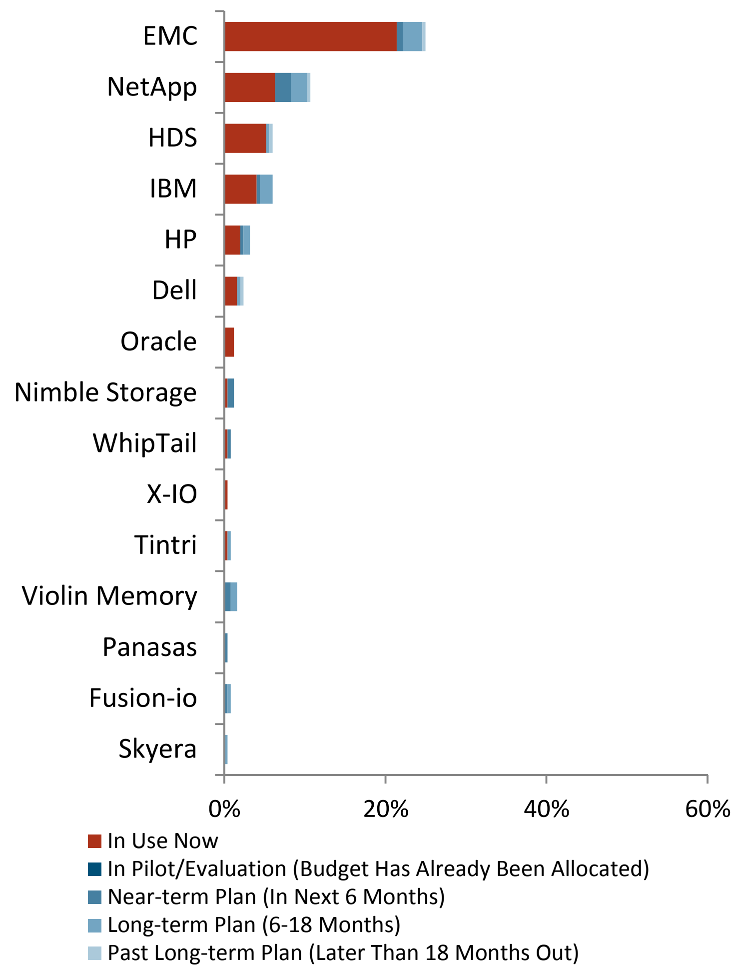




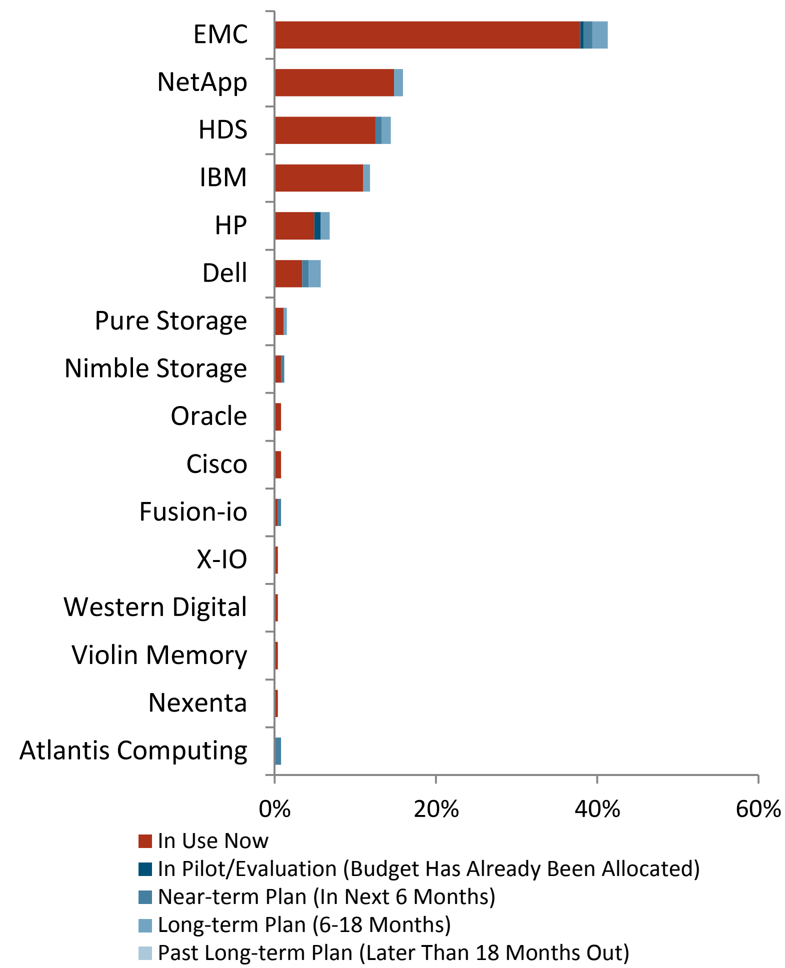
Left Chart, n=264. Top Right Chart: 1H '12, n=251; 1H '13, n=252; 1H '14, n=264. Bottom Right Chart: 2014 vs. 2013, n=260; 2015 vs. 2014, n=260. The 'implementation' charts use the same legend.

Flash in SAN/NAS Arrays – Time Series

1H '13



1H '14

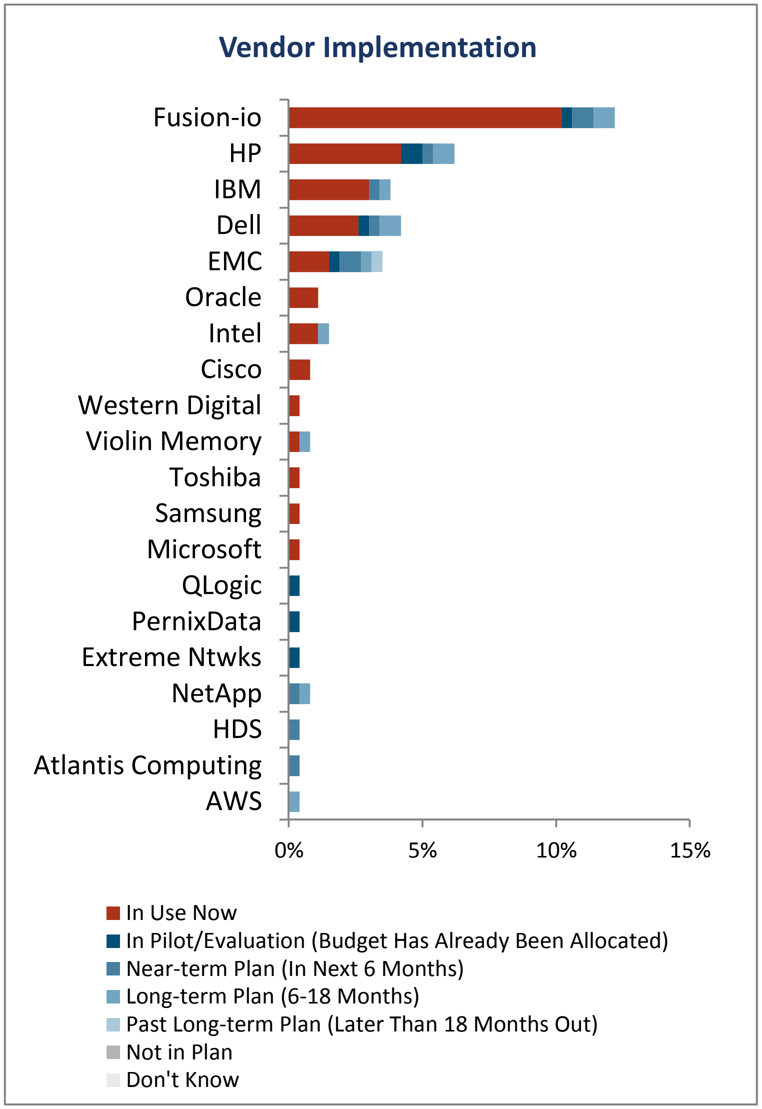


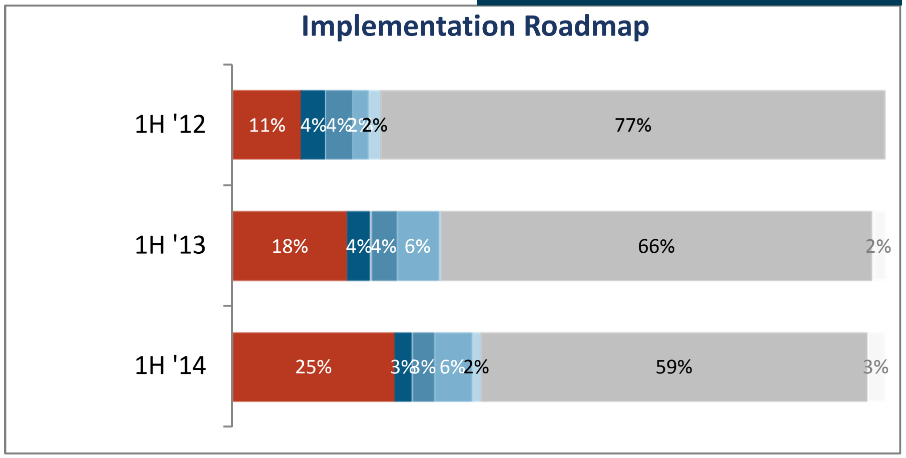
1H '13, n=252; 1H '14, n=264.

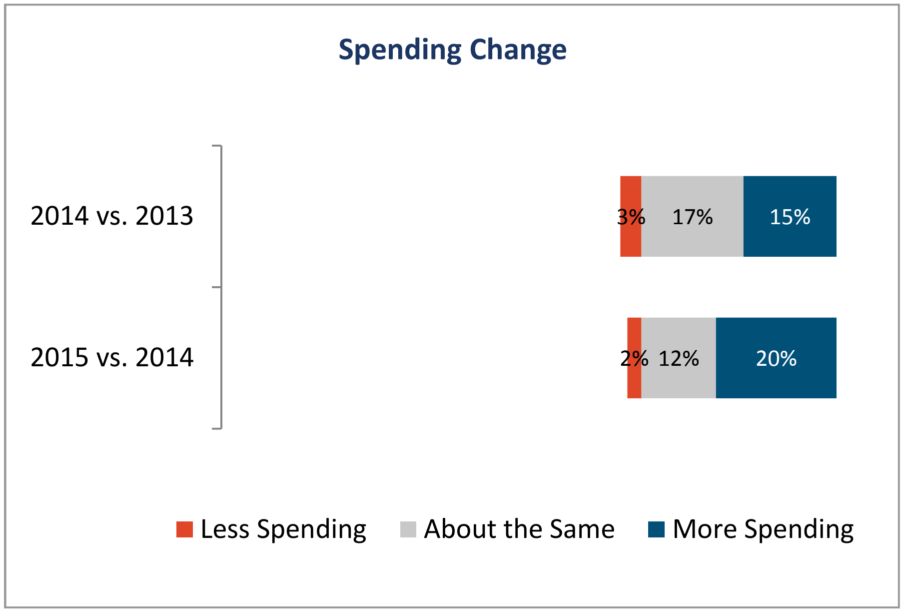
Source: Storage – Wave 18 |

Flash in Servers

Storage
Heat Index Rank: 4

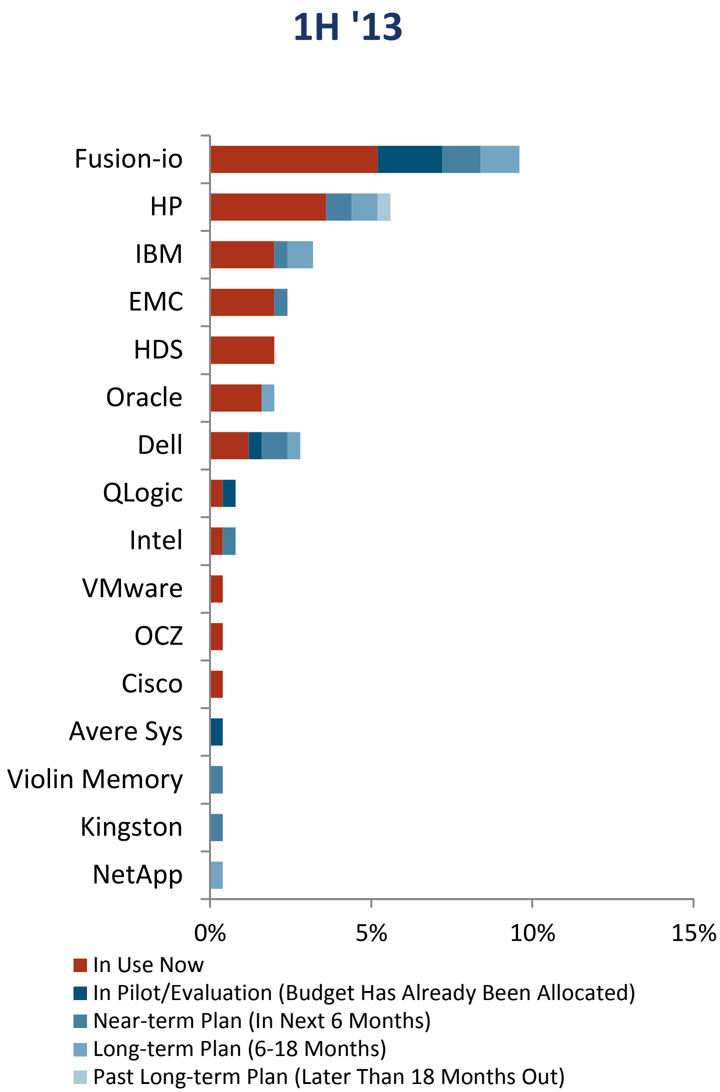


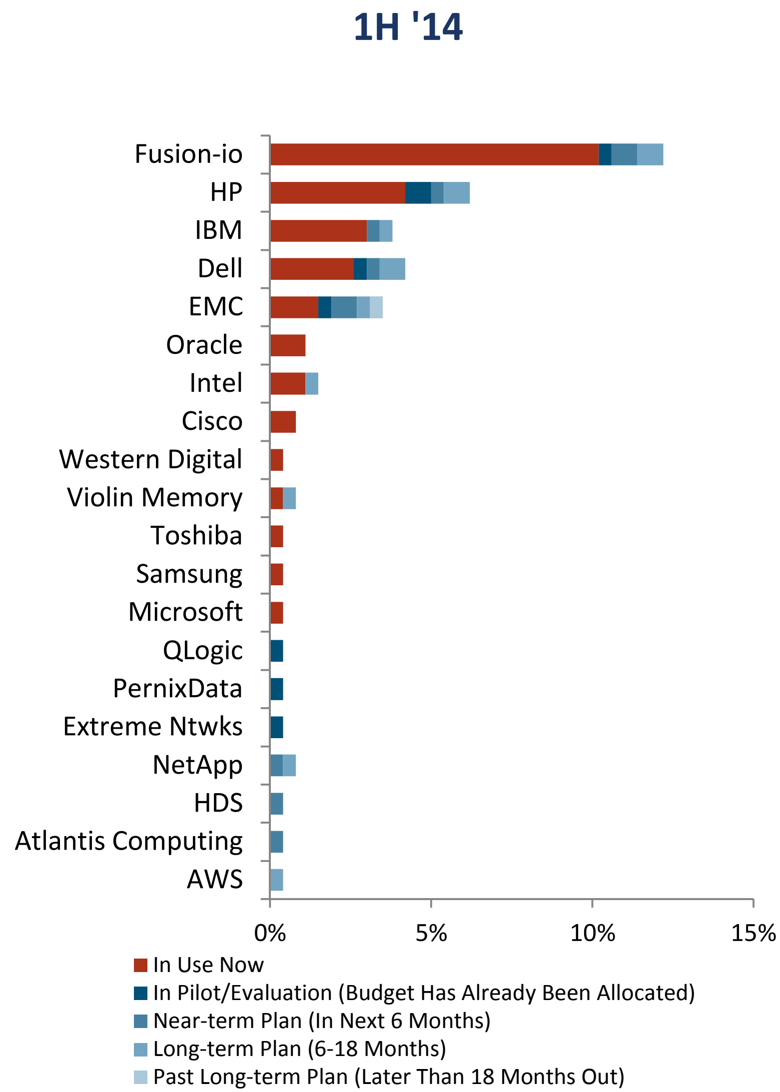




Left Chart, n=265. Top Right Chart: 1H '12, n=246; 1H '13, n=250; 1H '14, n=265. Bottom Right Chart: 2014 vs. 2013, n=265; 2015 vs. 2014, n=265. The 'implementation' charts use the same legend.

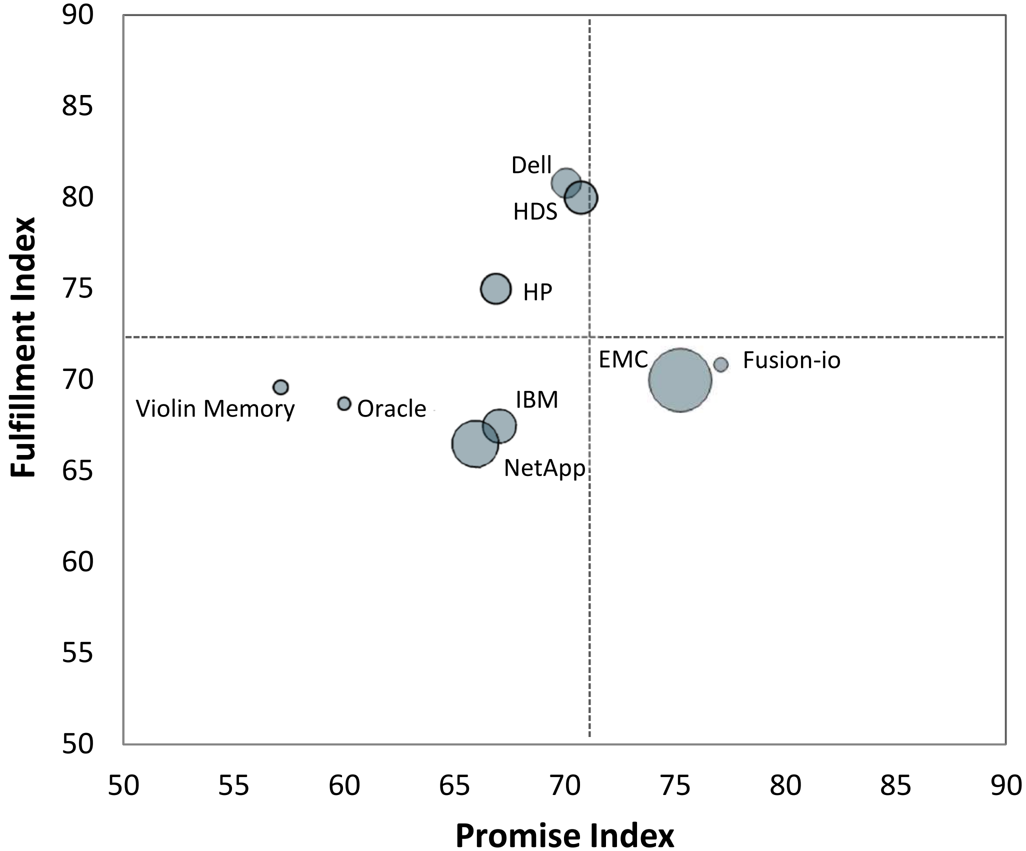
Flash in Servers – Time Series





1H '13, n=250; 1H '14, n=265.

Market Window – Array Vendors in Focus



Vendor	Promise Score	Fulfillment Score
Average	**71**	**72**
Dell	70	81
EMC	75	70
Fusion-io	77	71
HDS	71	80
HP	67	75
IBM	67	68
NetApp	66	67
Oracle	60	69
Violin Memory	57	70

The **Market Window** plots the Promise and Fulfillment Indexes to compare vendors' effectiveness at marketing and execution. A vendor placing in the upper right quadrant is rated highly for both its promise and ability to execute – underpromising and overdelivering – relative to its peers. Conversely, a vendor in the lower left quadrant rates poorly on the same criteria. The **Vendor Promise Index** is designed as a measure of marketing effectiveness. It uses 4 of the 14 customer ratings criteria (Competitive Positioning, Technical Innovation, Management's Strategic Vision, and Brand/Reputation), which are related to global concepts conveyed to potential customers prior to actual product/service delivery and use. The **Vendor Fulfillment Index** is designed as a measure of execution effectiveness. It uses 4 of the 14 customer ratings criteria (Value for the Money, Product Quality, Delivery as Promised, and Technical Support Quality), which are related to the physical product/service delivery and customer experience of using the product or service.

The size of the circle indicates the relative volume of ratings a vendor received. The intersecting lines indicate the average vendor score, including those for companies not depicted in the chart.

Low Promise, High Fulfillment	High Promise, High Fulfillment
Low Promise, Low Fulfillment	High Promise, Low Fulfillment

Dell, n=28; EMC, n=127; Fusion-io, n=6; HDS, n=35; HP, n=30; IBM, n=40; NetApp, n=76; Oracle, n=5; Violin Memory, n=7.

Customer Ratings

	AVG	Fusion-io	Violin Memory
Strategic Vision	*3.7*	4.2	3.3
Technical Innovation	*3.8*	4.3	3.9
Brand/ Reputation	*4.1*	4.0	2.4
Competitive Positioning	*3.8*	3.8	3.6
Value for Money	*3.7*	3.5	4.0
Product Quality	*4.1*	4.5	3.1
Delivery as Promised	*3.9*	3.7	4.1
Technical Support	*3.8*	3.7	3.9
Interoperability	*3.7*	3.7	3.1
Features/ Functions	*3.9*	4.0	3.1
Product Performance	*4.1*	4.5	4.6
Product Reliability	*4.2*	3.8	4.0
Sales Force	*3.7*	4.0	3.3
Ease of Doing Business	*3.7*	3.8	3.3

"Fusion-io, it is having a great impact on our VM environment." – LE, Telecom/Technology

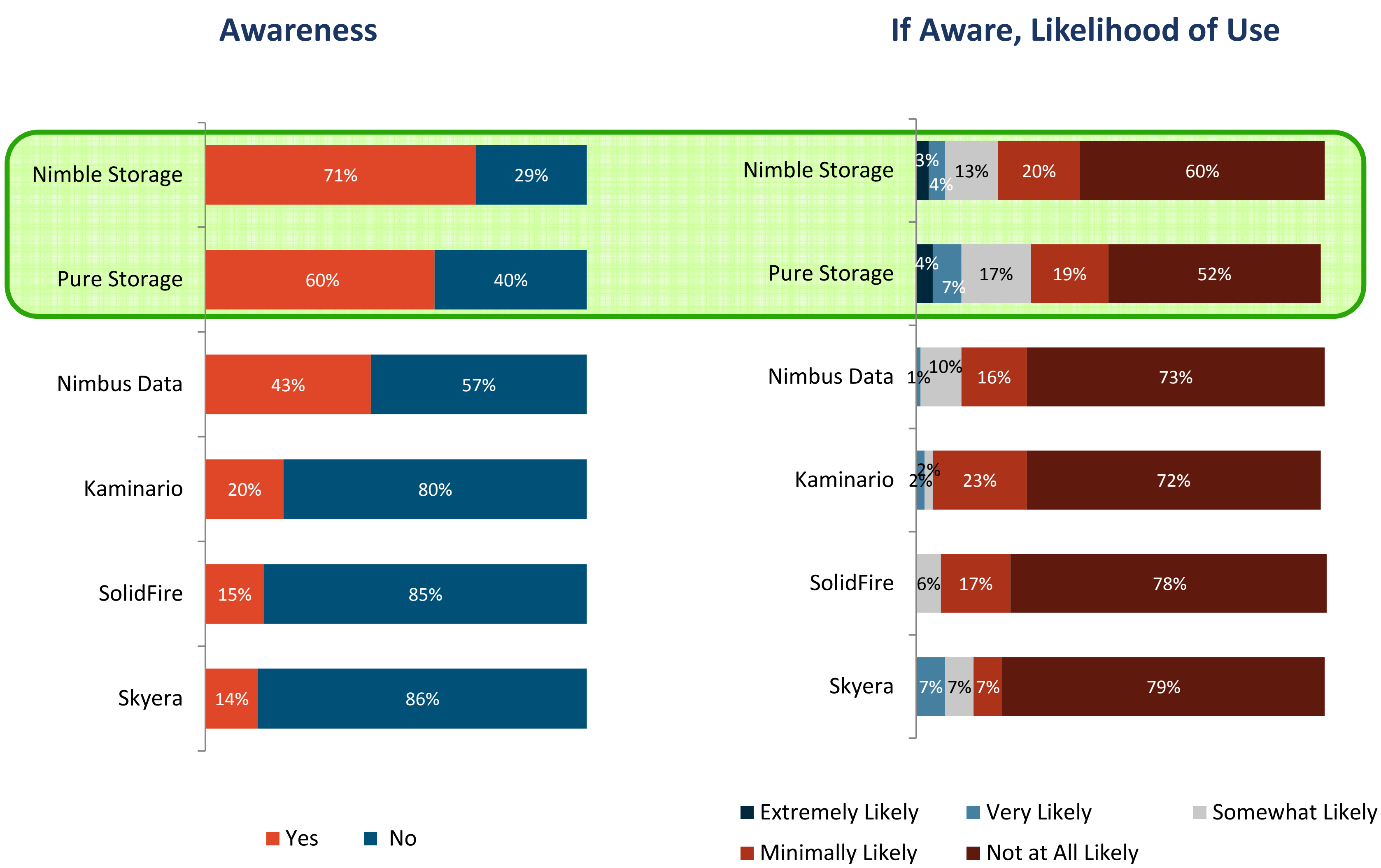
"The one that works. Fusion-io. Because that little card is sitting so close to the actual CPU and RAM, it outperforms all of its competitors. For the high intensity IOPS requirements. But it's too expensive." – LE, Education

"[Violin] Ease of doing business – maybe because they're new to us; the relationship hasn't been rocky, but not super smooth either." – LE, Services: Business/Accounting/Engineering

"Violin can do a better job with their feature sets. I would like expandability and integrated de-duplication." – LE, Telecom/Technology

Raw Scores: Respondents rated vendors using a 1-5 scale, with '1' being poor and '5' being excellent. Red highlighting indicates that the average score is at least .5 standard deviations below the mean ratings and green highlighting indicates that it is at least .5 standard deviations above the mean.

Emerging Vendor Awareness: Flash



Left Chart: Q. Are you aware of the following companies or products? Nimble Storage, n=213; Pure Storage, n=213; Nimbus Data, n=210; Kaminario, n=210; SolidFire, n=118; Skyera, n=211. Right Chart: Q. If yes, how likely are you to use that company or product in the next two years? Please use a 1-5 scale where '1' is not at all likely and '5' is extremely likely. Nimble Storage, n=145; Pure Storage, n=124; Nimbus Data, n=89; Kaminario, n=43; SolidFire, n=18; Skyera, n=29.

Thank you

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