A Forrester Consulting
Thought Leadership Paper
Commissioned By SanDisk

December 2014

Make Fast Data A Priority

Accelerate Revenue With Reduced Latency

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Executive Summary

While bigger has been equated with better in the white-hot big data movement, size matters little if data cannot be processed and quickly utilized by business stakeholders. Performance issues result in revenue losses for many firms and highlight the need to improve on-premises and cloud infrastructures to meet the performance needs for "fast data"— practices and technology that accelerate an organization's ability to turn data into real-time business insights.

In July 2014, SanDisk commissioned Forrester Consulting to evaluate the impact of performance latency on businesses. To further explore this trend, Forrester developed a hypothesis that tested the assertion that system performance is a gating factor to business success. In the study, we found that inadequate performance affects key areas such as customer experience, support, and strategic decision-making, which ultimately all have an impact on revenue to some degree.

In conducting an online survey of 162 business and IT professionals and in-depth interviews with three companies, Forrester found that businesses generally understand the importance of system performance but face a number of challenges in making sure that system performance is optimal for both internal IT systems and external-facing systems.

KEY FINDINGS

Forrester's study yielded five key findings:

- **Businesses are placing equal investment in internal systems and customer-facing systems.** Companies recognize that the business impacts of low latency reach beyond internal impacts, because customer-facing systems must also meet performance standards for the business to be successful.
- **Firms are losing revenue due to inadequate performance.** Survey results showed that 38% of firms were losing revenue because of the performance of their systems. Respondents that were losing out on revenue opportunities had lower overall ratings and lower confidence levels in their internal- and customer-facing systems.
- **There is a perception gap between business stakeholders and IT units regarding system performance.** While IT respondents gave their systems nearly perfect (96%) satisfaction ratings for their ability to process incoming data, nearly one in five marketing and business stakeholders (18%) was not satisfied with system performance.
- **Businesses are looking to their own IT departments first when addressing performance issues.** Most businesses indicated they initially look toward internal IT infrastructure and server improvements to improve the performance of their systems before looking to outsource.
- **Performance improvements must come with enterprise-class reliability.** Reliability for internal IT systems and customer-facing systems have equal importance when evaluating overall system performance. Though it may be tempting to throw fast hardware at an issue, without resiliency there is potential for downtime, data corruption, and inconsistency to derail the performance benefits yielded. Performance advancements must be linked to reliability and data integrity to be valuable for business results.

Businesses Recognize The Importance Of Infrastructure Performance And System Monitoring

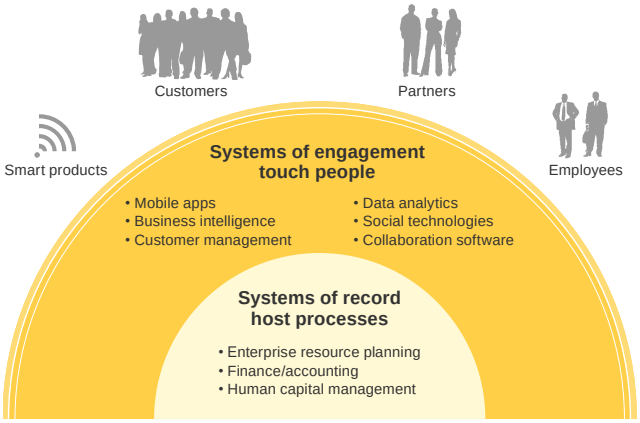
Although many companies with big data initiatives have made investments to harvest and gather as much data as possible for their businesses, a company can still miss out on major revenue-generating opportunities without efficient system performance. It makes little sense to find the proverbial needle in a haystack within your data if an opportunity to use that data disappears during the search. For example, a fraud detection system is less useful if it cannot flag a questionable transaction, or a series of transactions, before money has already changed hands.

Patience is no longer a virtue in the age of the customer, which Forrester defines as a time in which the power has shifted to digitally empowered consumers who demand access to information where and when they need it. Patience is a luxury that most businesses cannot afford, and the need for fast data will increase the need for low latency performance.

Speed is the new differentiator for businesses across all industries.[1] It will be the only way companies will be able to cope with the massive data surges that will come from the 1 trillion connected objects and devices that will exist in 2015 via the Internet of Things (IoT).

Today and in the future, firms will be evaluating themselves based on a concept Forrester has called "the speed of the customer," which is defined as:

FIGURE 1
Systems Of Record And Systems Of Engagement



Source: "Forrsights: European Companies Start To Embrace New Systems Of Engagement," Forrester Research, Inc., August 22, 2012

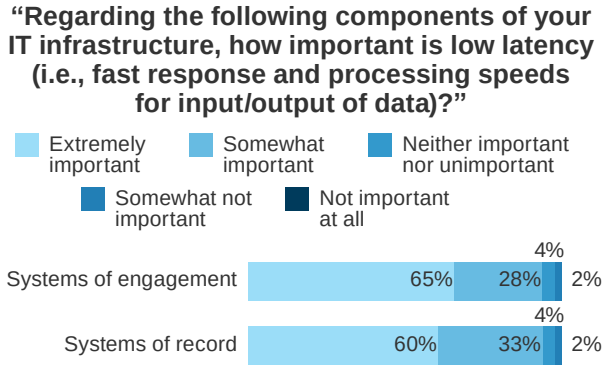
The speed at which business must operate to satisfy the customers' need for immediate information, product, or service delivery. This speed will vary by industry and by engagement but must be as near to real-time as possible, as timing becomes increasingly critical to an enhanced customer experience.

Organizations today have two major types of infrastructure in their environments, which will both be benchmarked against the new requirements of the speed of the customer in regards to system performance (see Figure 1):

- **Systems of engagement** are systems that empower customers, partners, and employees with context-rich apps and smart products to help them decide and act immediately in their moments of need. This includes mobile applications, business intelligence (BI), and collaboration technologies.
- **Systems of record** are traditional systems that focus on processes and transactions and include core enterprise resource planning (ERP) systems, finance and control systems, and human capital management systems.

To succeed, businesses must operate at the speed of the customer (i.e., have low latency performance) for both systems of engagement (SOE) and systems of record (SOR). Our survey results showed that 65% of respondents feel that high-performance SOE are extremely important for their business, with 60% reporting that SOR are extremely important (see Figure 2). As well, 60% of respondents monitor performance for both systems and have

FIGURE 2
Low Latency Is Important For Systems Of Engagement And Record



Base: 162 digital customer experience or business technology decision-makers

Note: Percentages may not total 100 because of rounding.

Source: A commissioned study conducted by Forrester Consulting on behalf of SanDisk, July 2014

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performance service-level agreements (SLAs) in place for both systems.

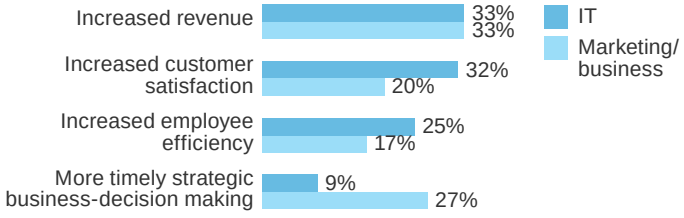
Survey respondents also identified a number of positive business impacts beyond increased revenue that could be derived by accelerating performance of these systems, including (see Figure 3):

- **Increased customer satisfaction.** Customers expect and demand information throughout the entire purchasing cycle, from presales through the transaction and to the delivery and logistics of order fulfillment. Any information dropoffs in the sales cycle will reduce customer satisfaction now that instant gratification is the expected norm.
- **Increased employee efficiency.** By reducing processing latency, employees can get their jobs done quickly, which empowers them to be more engaged and impactful with your customers.[2] Productive employees will convert the potential energy of customer engagement into the kinetic energy of productivity.
- **Timely strategic business decision-making.** Data-derived insights have an expiration date, and these insights must be delivered to business stakeholders as quickly as possible to take advantage of situations before competitors can react — or before market conditions shift away from an opportunity.

FIGURE 3

Fast Data Processing Has Impacts Beyond Just Increased Revenue

"What is the top positive business impact of being able to access and process data immediately?"



Base: 162 digital customer experience or business technology decision-makers

Source: A commissioned study conducted by Forrester Consulting on behalf of SanDisk, July 2014

Businesses Are Missing Revenue Opportunities Based On System Performance

The real costs of latency are not fully understood by today's businesses. By steering focus toward performance acceleration and modern "fast data" architecture, businesses will be able to reach positive business outcomes quicker, which is critical to winning, serving, and retaining customers.

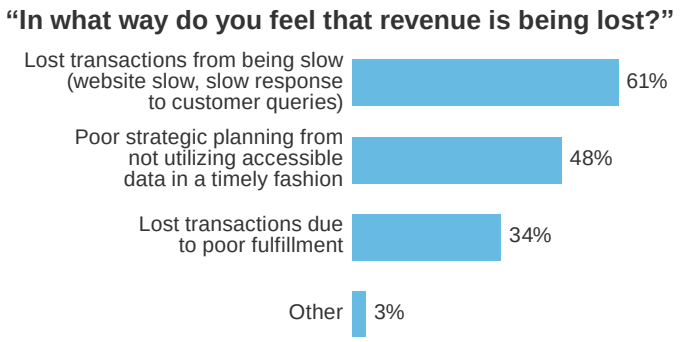
When asked if they felt their company was losing revenue opportunities based on the performance of their computing systems, a surprising 38% of respondents said yes. Further probing revealed that these businesses are losing revenue based on system performance due to the following factors (see Figure 4):

- **Lost transactions.** Slow websites and slow response to customer queries created revenue loss for 61% of respondents.
- **Poor strategic planning.** For 48% of respondents, data value died on the vine because slow performance prevented firms from utilizing accessible data in a timely fashion.
- **Poor fulfillment.** Most organizations have time-specific tasks that have little to no tolerance for slow fulfillment. An interviewee from a financial services company discussed performance challenges related to end-of-day reports, for which there is a short 2-hour window for processing and delivery. Missed deadlines resulted in SLA penalties and lost customer confidence, and, ultimately, these results resulted in lost revenue.

> *"Performance is a critical component for meeting SLAs. We meet SLAs or we lose revenue. If we do not meet performance SLAs, we prevent new customers and partners from getting on board with our services and products."*
>
> Assistant vice president, financial services

FIGURE 4

Lost Transactions Are The Primary Form Of Revenue Loss Based On Poor Performance



Base: 61 digital customer experience or business technology decision-makers

Source: A commissioned study conducted by Forrester Consulting on behalf of SanDisk, July 2014

While not all companies feel they are losing revenue based on the current performance of their system, they are very aware of the impact that poor system performance could have on their business.

Systems of engagement are the most directly tied to company revenue, as they provide the interface through which the majority of customer interactions take place. As such, loss of revenue, loss of new customer opportunities, and lack of data for business intelligence were listed as the most significant areas of potential impact resulting from poor SOE performance. Systems of engagement serve as the public face for companies. Outages, sluggish performance, or inaccurate information reflect poorly on a company and can damage its brand.

Likewise, while not customer-facing per se, systems of record performance issues can also damage a company, as SOR often handle the back end of customer requests. Survey respondents indicated that loss of new customer opportunities, order inaccuracies, and loss of revenue and employee productivity are the most significant areas of potential impact for poor SOR performance. SOE and SOR work side by side and are constantly exchanging data, and as more investments pour into SOE to match client expectations, SOR performance must continue to improve to keep pace.

The Performance Disconnect Between Marketing And Business Stakeholders And IT Is The Challenge Ahead

Though there is universal acceptance of the importance of performance, there is a distinct perception gap related to the confidence in which IT and business professionals have in their systems. Only 13% of business respondents felt that their SOR were exceeding expectations for SLAs and 15% felt that way for SOE, compared with 45% and 37% of IT respondents, respectively.

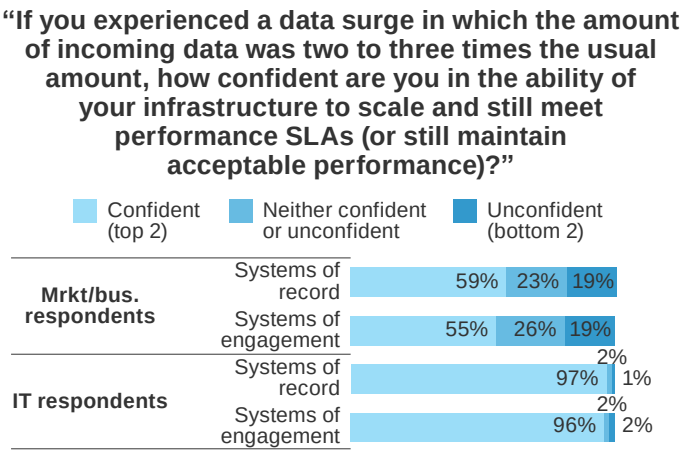
While neither group feels that the systems are performing below standards, this gap in the results hints that these two groups have different views and expected outcomes for each system, which could help explain the gap. Reasons include:

- **IT staff are alienated from the actual business results and might not see full impacts.** Though IT staffers recognized that suboptimal performance had a direct impact on their company's performance, qualitative interviews with respondents revealed that few respondents knew exactly how much revenue was lost from slow performance. Losses typically come either through SLA penalties or discarded shopping carts in eCommerce sites, for which business stakeholders and marketing/sales staff have more direct knowledge.
- **Business and marketing respondents have different objectives for why they need high system performance.** Businesspeople are very concerned about having data to make more timely strategic business decisions, whereas the most important impacts for IT are focused on customers' satisfaction for purposes of ensuring a seamless user experience.
- **IT users are more confident in the scalability of the systems.** When given a hypothetical scenario of a data surge, the majority of IT respondents had high confidence (96% to 97%) in the continued performance of their systems, compared with only 55% to 59% confidence coming from business decision-makers. Furthermore, 19% of marketing and business stakeholders are not confident about system performance (see Figure 5).

The discrepancy between the perceptions of IT and business professionals highlights the changing relationship between the providers of IT services and their customers.

FIGURE 5

Business Users Are Less Confident In The Ability To Scale In The Event Of A Surge



Base: 162 digital customer experience or business technology decision-makers

Note: Percentages may not total 100 because of rounding.

Source: A commissioned study conducted by Forrester Consulting on behalf of SanDisk, July 2014

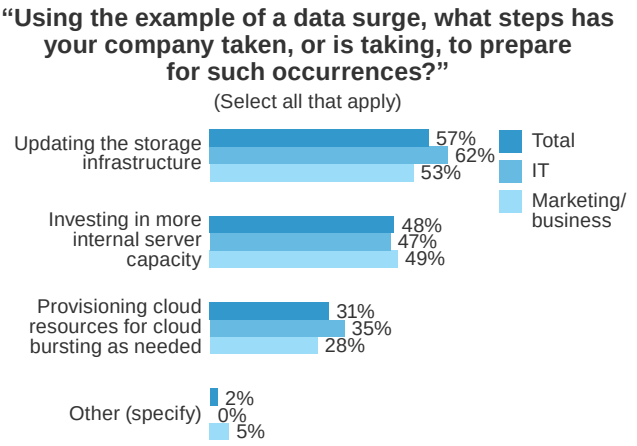
With the speed of the customer changing customer expectations, the need for rapid performance and provisioning is accelerating to a point where real-time or near-real-time delivery is becoming the only acceptable outcome. Ultimately, this has made business stakeholders less confident about the infrastructure resources at their disposal, whereby simply meeting an SLA is not enough to inspire long-term confidence.

Businesses Are Looking To Make Internal Improvements

Businesses are already monitoring and setting up SLAs for their systems, and the majority reported that they feel satisfied with their ability to handle both existing data and incoming data efficiently in real time. For those businesses that feel confident about their current capabilities, 39% attribute it to previous investments in infrastructure systems and software, and 30% attribute it to expanded internal computing capacity. Expanded computing capacity through outsourcing/cloud was also listed as an option, but the overall percentage of respondents choosing this option was less than the first two options, at 24%.

FIGURE 6

Businesses Look To Make Internal Storage Improvements



Base: 162 digital customer experience or business technology decision-makers

Source: A commissioned study conducted by Forrester Consulting on behalf of SanDisk, July 2014

This focus on internal improvements was further supported by another question, which asked what companies have done or are doing to prepare for events such as a data surge (see Figure 6).We asked what steps they have taken around:

FIGURE 7

Enterprises Are Using SSDs To Accelerate Their Infrastructure

"Which of the following technologies has your firm *implemented*

	Manufacturing	Retail, wholesale	Business services, construction	Media, entertainment, leisure	Utilities, telecom	Financial services, insurance	Public sector, healthcare	All
SSDs	33%	45%	39%	36%	31%	44%	33%	**37%**
Converged infrastructure systems	41%	45%	33%	56%	20%	22%	26%	**34%**
Modular data center equipment	35%	31%	27%	43%	45%	46%	18%	**32%**
Engineered systems optimized around key workloads	32%	31%	31%	47%	31%	33%	16%	**29%**
Object storage systems	23%	48%	24%	47%	24%	34%	20%	**27%**
HPC or grid computing clusters	21%	21%	20%	37%	35%	31%	15%	**26%**
Automation software	29%	41%	22%	33%	27%	39%	12%	**26%**
Software-defined storage	31%	36%	23%	43%	21%	32%	10%	**25%**

Base: 575 enterprise IT hardware decision-makers

Source: Forrsights Hardware Survey, Q3 2013, Forrester Research, Inc.

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- **Storage improvements.** Unlike commodity networking and server processors, hard-drive-based storage media and systems have not gotten much faster in the past decade. Capacity expansion and density have been the key focus areas for storage innovation, but now is the right time to evaluate new flash storage technologies to accelerate performance and eliminate storage bottlenecks in the infrastructure. Flash-based solid-state disks (SSDs) provide a distinct performance and cost efficiency benefit relative to hard drives. SSDs are among the top new technologies that companies across multiple industries are implementing (see Figure 7).
- **Server improvements with flash technology.** Commodity x86 servers continue to increase their processing capabilities with every generation, but to maximize CPU utilization, organizations are adding server-resident flash for memory extension and to act as a low latency performance tier.
- **Cloud capacity.** Systems of engagement can benefit from leveraging the storage, processing, and network bandwidth resources of cloud storage and compute platforms to deal with unpredictable and bursty workloads. Hybrid clouds, which blend on-premises resources with services, are the future state for infrastructure. At this point, only 31% of decision-makers are looking to cloud burst, while the majority are focused on internal improvements.

Flash-based SSDs can provider high performance with a much smaller footprint since a single SSD has the performance of dozens of conventional hard drives. When businesses are looking at overall costs, SSDs can provide high transaction level performance at a lower cost relative to hard drives (see Figure 8).

Businesses understand the value of their internal- and external-facing systems and the commitment to improving the performance for both. Survey respondents indicated that current spending between SOR and SOE is 53% and 47%, respectively, which demonstrates balanced priorities.

As well, companies place an equal importance on performance and reliability. Raw performance on its own is not sufficient since customers must have reliable services to avoid business disruptions. They must also have storage consistency to ensure data is not lost or corrupted in active and dynamic data center environments.

FIGURE 8

Solid-State Disk Delivers Performance At Lower Costs

	Solid-state disk	Hard drive
Price:	$3,600	$700
IOPS rating:	7,500 IOPS	200 IOPS
GB:	400 GB	600 GB
$ per IOPS:	48 cents per IOPS	$3.50 per IOPS
$ per GB:	$9 per GB	$1.17 per GB
Number to reach 7,500 IOPS:	1	37.5
$ to reach 7,500 IOPS:	$3,600	$26,250

Source: “Build Your Business Case For All-Flash Storage Arrays,” Forrester Research, Inc., August 21, 2013

Key Recommendations

To meet the current and future performance demands of business stakeholders, partners, and customers, organizations should take the following steps:

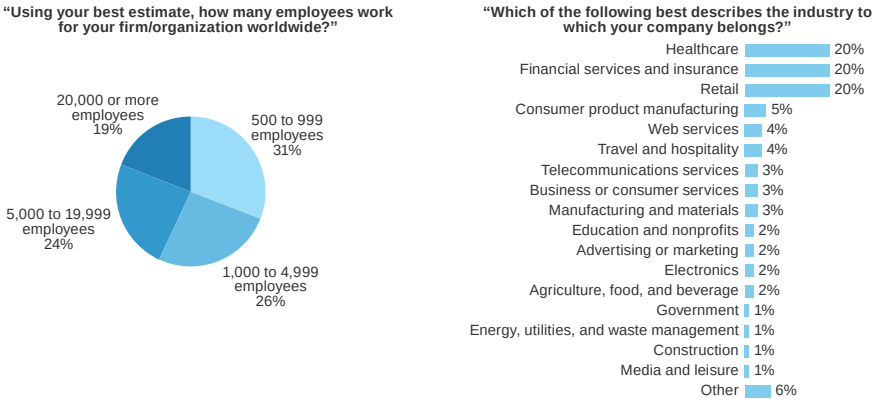
- **Balance big data initiatives with fast data.** The size and capacity infatuation associated with big data must change. Business stakeholders should shift business technology initiatives from data hoarding to data harvesting. The amount of data you store is irrelevant if the business cannot squeeze value out of it in a timely and repeatable fashion, especially when there is a surge in requests for data.
- **Know your data.** For most firms, the 80/20 rule applies, whereby 80% of transactions are driven by 20% of the data and applications in an environment. Understanding which systems hold the data that is most critical to your business is key, because this will allow you to optimize the performance tier appropriately. Caching, tiering, and storage virtualization technologies can help facilitate the movement of data between performance and cost-efficient storage tiers to maximize the utilization of resources.
- **Track missed opportunities with stakeholders, and collaborate to optimize infrastructure objectives.** There is a distinct perception gap of performance satisfaction between IT and business stakeholders, and often storage and infrastructure teams do not know the material impact of performance on the business. Performance for all internal- and external-facing systems must become part of your company's culture — and proactive changes must be made to streamline processes for provisioning and upgrading resources to match company needs.
- **Consider internal storage and server upgrade options as a way of improving system performance and safeguarding from data surges.** When asked what attributed to making their systems perform at a satisfactory level or higher, respondents listed these top two reasons: 1) investments in infrastructure systems and software and 2) expanding internal computing capacity. Outsourcing to the cloud was third on the list, but clearly outsourcing isn't the first option. Improvement options, such as adding SSDs to servers and storage systems to boost performance, were a higher priority for respondents.
- **Remember that the location of flash matters for latency.** Physics dictates that solid-state storage latency is lowest when the flash media is physically close to a server's CPUs and can drop latency down to microseconds, in contrast to network attached storage (NAS) and storage area networks (SANs), which have latencies closer to a millisecond. Transaction-sensitive applications will run fastest with server-centric PCIe flash cards and DIMM-slot-resident flash devices.
- **Emphasize performance and reliability.** Performance alone is not sufficient for today's systems, because speed cannot come at the expense of application reliability and data integrity. Any technology that is introduced to accelerate environments for mission-critical workloads must have fault tolerance and resilience to protect data in the event of a hardware failure or power outage.

Appendix A: Methodology

From June 2014 to July 2014, Forrester fielded an online survey to 162 respondents, with 51% of respondents representing marketing and business roles (customer experience, customer service, and business analyst) and 49% coming from traditional IT (application development, enterprise architecture, and business process design). The respondents represented organizations with over 500 employees, and the survey had 20% representation from the healthcare, financial services, and retail vertical markets, respectively. Forrester also interviewed three business technology executives with knowledge of their firm's systems of record and engagement.

Appendix B: Demographics/Data

FIGURE 9
Company Size And Industry



Base: 162 digital customer experience or business technology decision-makers
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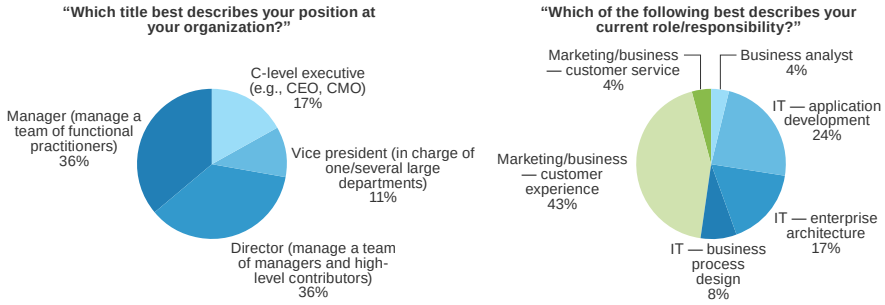
FIGURE 10
Respondent Title And Role



Base: 162 digital customer experience or business technology decision-makers
Note: Percentages may not total 100 because of rounding.
Source: A commissioned study conducted by Forrester Consulting on behalf of SanDisk, July 2014

Appendix C: Endnotes

[1] Source: “In The Age Of The Customer, Insight Isn’t Enough,” Forrester Research, Inc., June 4, 2014.

[2] Source: “Measure Workforce Experience Through Engagement, Productivity, And Customer Impact,” Forrester Research, Inc., May 7, 2013.