Big Data Executive Survey

Themes & Trends

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Foreword | Thomas H. Davenport

I'm pleased that NewVantage Partners conducted this survey and made the results available to me for review prior to publication. There is a lot of interest in the topic of "Big Data" as evidenced by the high response rate to the survey. The survey yielded some interesting findings, many of which are relevant to research I have conducted. Here are several that are worthy of comment:

There is more going on in large firms in the Big Data space than I would have expected. Both the press and my research suggest a high level of Big Data activity among startups, but less among large companies. This may mean that financial services companies, which were heavily represented in the survey, are ahead of most other firms in their exploitation of Big Data. It may also mean that the respondents didn't make a strong distinction between Big Data and traditional analytics projects.

The results suggest—and I already believed—that Big Data is not a terribly useful term. For the survey respondents, the variety of data sources is a more salient attribute than the volume of the data. Perhaps we should call it "mashup data" instead.

My research on Big Data startups suggests that the primary objective is less to support internal decision-making, and more to support new customer-facing products and processes. There is some support for this in the survey; three years from now, the most common benefit expected is an improved customer experience. Now, however, it's better decision-making.

Regardless of whether the data are supporting decisions or products/processes, the primary beneficiary of Big Data appears to be the customer. The single most common application of Big Data in this survey is probably—reading between the lines of several question responses—the use of multiple customer data sources to better understand their needs and target promotions and offers to them.

Big Data is often described as unstructured, but these responses suggest that structured transactions are the most common data source. In many cases these are probably being combined with less structured data like web clickstreams and social media content.

Since the respondents are focused on integrating various sources and types of data, **data integration will continue to be one of the greatest challenges faced by IT organizations.**

There is a storm approaching on the Big Data talent front; 70% say they plan to hire data scientists, but they already find this "challenging" to "extremely difficult," and there is no reliable source of new talent in this category. It would seem to be a wise move to begin "building" such talent as well as "buying" it. In addition, the survey results suggest that organizations need to provide training to executives and decision-makers on how Big Data is going to change their businesses, and how to manage it.

This sampling of Big Data activity is one of the few I have seen that focuses on large organizations and offers responses from C-level executives. It should be very useful to organizations in suggesting immediate and longer-term actions for managing this valuable new resource.

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Introduction

During the summer of 2012, NewVantage Partners conducted an exclusive survey with C-level executives and function heads from many of America's leading companies. This is the first in-depth industry survey targeted at the most senior Fortune 500 and Federal agency business and technology leaders responsible for overseeing enterprise Big Data initiatives.

This survey delves into a broad range of topics and offers useful insights and observations from some of the world's leading companies. We are pleased to share with you the results of the NewVantage Partners' "Big Data Executive Survey."

Methodology

The survey posed 65 in-depth questions designed to provide a useful benchmark for enterprises seeking to understand the state of Big Data initiatives among peer institutions, and to answer critical questions such as:

- How much are enterprises investing in Big Data initiatives?
- Where is the sponsorship and funding for Big Data initiatives coming from?
- What are the initial applications, kinds of data, and solutions/approaches that enterprises are employing for their Big Data initiatives?
- Why is Big Data an important initiative for leading enterprises?
- Where do organizations stand in terms of the comparative maturity of their Big Data initiatives and their rate of progress?
- Which kinds of enterprises are at the forefront of Big Data capabilities and initiatives?

Demographics

Survey respondents included Chief Data Officers, Chief Information Officers, Chief Technology Officers, Chief Analytics Officers, Chief Information Architects, Line-of-Business Heads, and senior Function Heads (SVP/VP). The breakdown of respondents was as follows:

- C-Suite Executives – 30%
- Enterprise Function Heads (EVP/SVP) – Head of Analytics, Head of Informatics, Head of Enterprise Information – 50%

- Data Program Head (SVP/VP) – Head of Data Architecture, Chief Data Architect – 20%.

Organizationally and functionally, the roles of the respondents were:

- IT – 47%
- Business Analytics – 30%
- Line of Business Management – 23%

Over fifty executives representing leading Fortune 1000 and large Federal agencies participated in the survey. All participants were executives with budgetary and decision-making responsibility or direct visibility and influence for Big Data initiatives.

Financial service companies have traditionally been at the forefront of using strategic data and analytics to support their core business functions and they were the most strongly represented industry group. Industry representation is summarized as follows:

- Financial services – 53%
- Insurance – 19%
- Government – 10%
- Other business – 18%

The majority of these organizations are very large, with at least 30,000 employees, and they operate diverse businesses in multiple markets. A complete list of participating institutions is provided in Appendix A.

We wish to thank all of those individuals and organizations that participated in the survey. Individual respondents and individual company responses will remain anonymous.

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Executive Summary

"Big Data" is top of mind for leading industry executives and our Big Data Executive Survey identifies an interesting set of trends and themes for businesses. These include:

The Promise of Improved Data-Driven Decision Making: Big Data has arrived and is being tested or is in use at major organizations – 85% of the respondents have Big Data initiative planned or in progress. Analytic capabilities in companies are still challenging, but regardless of those skills, all respondents are looking for Big Data to have a major impact on their business. The primary reason organizations are investing in Big Data is to improve analytic capabilities and make smarter business decisions.

Customers and Risk are Primary Focus: Big Data is being considered for a surprisingly broad range of applications. In all, 17 different business functions were named as driving Big Data initiatives. However, when asked to identify the biggest opportunity for Big Data, over half the respondents cited customer insights and customer experience.

It's About Variety, not Volume: The survey indicates companies are focused on the variety of data, not its volume, both today and in three years. The most important goal and potential reward of Big Data initiatives is the ability to analyze diverse data sources and new data types, not managing very large data sets.

Organizational Alignment is Critical to Success: Big Data initiatives need to address organizational and data silos to achieve success. 80% of the respondents saw Big Data initiatives as reaching across more than one line-of-business or function.

Biggest Roadblock May Be More About People Than Technology: The big data opportunity carries with it a huge challenge around organizational development and change. More than just new technical skills, organizations are looking to create new roles, processes, and programs to leverage big data. However, expanding these teams with new leadership that understands big data and its application is viewed as very challenging. 42.6% rated "the ability, by executives and business leaders, to use data and analytics to improve or transform business" as less than adequate.

This survey delves into these topics and offers useful insights and observations from some of the world's leading companies. The survey also identifies both current trends and projected plans over the next three years. We hope you enjoy the survey and find it a useful resource.

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Major Themes and Trends

This report summarizes our high level observations and shares the major themes and trends identified by the survey. We also plan to publish additional reports focused on specific industries and issues in Big Data.

To establish a baseline on what "Big Data" is, at the beginning the survey the following definition was given to the participants:

Big Data is a term used to describe data sets so large, so complex or that require such rapid processing (sometimes called the Volume/Variety/Velocity problem), that they become difficult or impossible to work with using standard database management or analytical tools. Manipulating data sets like these often require massively parallel software running on tens, hundreds, or even thousands of servers.

Big Data growth includes the explosion of social media, video, photos, unstructured text in addition to the data gathered by ubiquitous sensing devices including smart phones. Among the many difficulties associated with Big Data are capture, storage, search, sharing, analysis, and data visualization.

In reviewing the survey results, several themes became clear. What follows is an explanation and interpretation of these themes and potential trends. Please note that in certain cases, the total percentage in a table does not always add up exactly to 100%, but a number very close to it (e.g. 99 or 101), because of rounding.

The Promise of Improved Data-Driven Decision Making

Big Data has arrived and is being tested or is in use at major organizations. 85% of the respondents have a Big Data initiative planned or in progress and almost half are using Big Data in some type of production/operational capacity, ranging from production reporting to 24/7 mission-critical applications.

Why Big Data?

The primary reason organizations are investing in Big Data is to improve analytics capabilities and make smarter business decisions. Most respondents cited the ability to integrate and analyze a wide variety of data as the primary value of Big Data platforms. [Figure 1] They are using Big Data to address significant gaps in accessing relevant data and developing analytic skills. Over half the respondents rate their "access to

Figure 1
What are the primary data issues driving you to consider Big Data?
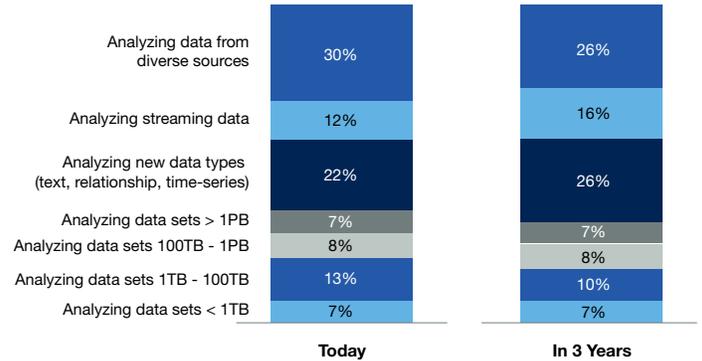
Figure 2
How would you rate the analytic capabilities in your company today?
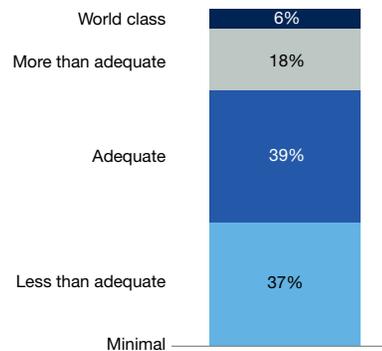
relevant, accurate and timely data" as less than adequate and only 21.3% rank their company's analytic capabilities as "more than adequate" or "world class." [Figure 2]

Whether their current analytics capabilities are ranked as "minimal" or as "world class," all respondents are looking for Big Data to have a major impact on their business. Advanced companies with large analytic staffs (over 25% of respondents have over 500 data miners and analysts) are seeking to push the productivity of these teams with advanced tools and automation, while less mature companies hope to use Big Data to leapfrog their capabilities to gain to parity.

Most are Exploring, But Some Leaders are Emerging

While most organizations have begun allocating exploratory budgets for investigation and growth, some leaders are making a major commitment to Big Data. About a quarter of the companies are spending under $1 million annually to evaluate Big Data, while half are launching preliminary solutions with budgets between $1 million and $10 million dollars. A quarter of the respondents are

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Figure 3
What is the budget for Big Data initiatives?

| Budget	Today	In 3 Years
More than $10 Million	24%	36%
$1 Million - $10 Million	48%	36%
$100,000 - $1 Million	24%	22%
Less than $100,000	5%	6%
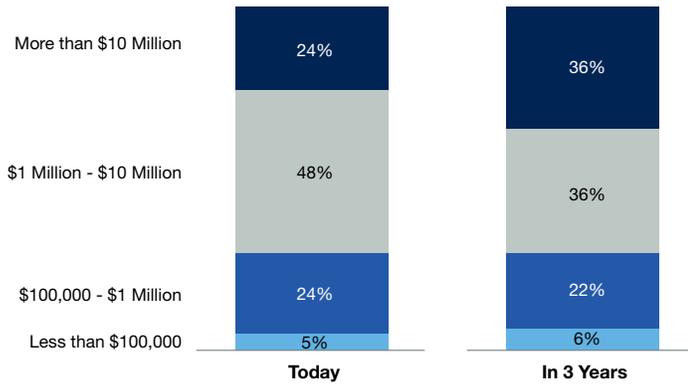
even more committed, spending in excess of $10 million on Big Data this year. And a handful are forecasting spending over $100 million annually in 3 years. [Figure 3]

For half the respondents this is an incremental spend and could be just the beginning for increased budgets for Big Data. On average, each respondent will spend more than $14 million annually on Big Data in 3 years.

Initiatives are Supported from the Top and Cross Multiple Lines of Business

Big Data clearly has the attention of the C-suite. 40% of the respondents held a C-level title and two-thirds of them are seeking a broad, enterprise benefit from Big Data. Over 75% expect an impact across multiple lines of business, and a C-level executive or head of a line of business is sponsoring 85% of the initiatives. [Figure 4] The thought leadership behind these initiatives is also cross-functional with 75% of respondents indicating they are coming from a business/IT collaboration.

Figure 4
At what level in the organization does Big Data thought leadership reside?

Level	Percent
Deeper in organization (Other more down)	2%
Department within LOB or function (4 down)	2%
	10%
LOB or function head (2 to 3 down)	36%
Corporate, C-suite (CEO or 1 level down)	50%
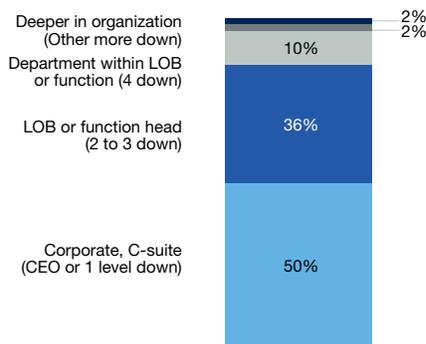
Companies expect to generate business value from Big Data, but vary on how to measure it. Over half do not have a ROI–driven business case, but 85% expected a qualitative or quantitative benefit to business or IT performance. The top two benefits cited are better, fact-based decision-making and improved customer experience. [Figure 5]

Figure 5
What tangible benefits do you hope to achieve through your Big Data initiatives?
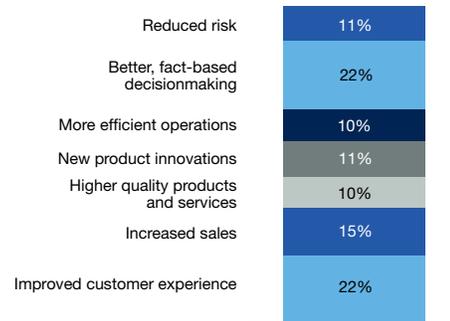
Benefit	Percent
Reduced risk	11%
Better, fact-based decisionmaking	22%
More efficient operations	10%
New product innovations	11%
Higher quality products and services	10%
Increased sales	15%
Improved customer experience	22%

Customers and Risk are Primary Focus

Big Data is being considered for a surprisingly broad range of applications. In all, 17 different business functions were named as driving Big Data initiatives (the 9 listed below and 8 identified as "other," such as finance, actuarial, clinical analysis, and investment management.) [Figure 6]

Figure 6
What business functions in your company are driving Big Data initiatives?

Function	Percent
Risk Management	43%
Operations	29%
Information Technology	52%
Product Development/ Management	36%
Customer Service	40%
Customer and Market Analysis	69%
Fraud Management	48%
Direct and Online Marketing	40%
eCommerce, eBusiness, Online Operations	52%

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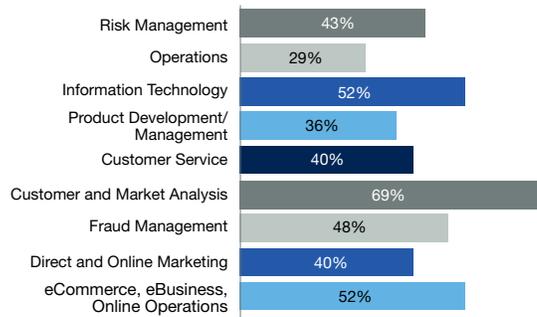
However, when asked to identify the biggest opportunity for Big Data, some dominant themes emerged. Half the respondents cited customer insights or customer experience as the biggest opportunity:

> "Understanding cross-channel activities to signal a customer opportunity/action"

> "Customer retention and customer experience"

> "We are just starting to explore. Largest potential is to understand customer trends and issues."

> "I believe the biggest opportunity is in enhancing our ability to more accurately target consumers to provide them with a differentiated, more personalized experience. A close second would be better understanding our consumers to more effectively inform the product development process."

The other most-cited opportunities were marketing, fraud detection, product innovation, and service efficiency and quality, multi-channel coordination, and process efficiencies.

This diversity, with strong focus on the customer, also emerged in the data domains being incorporated in Big Data initiatives. Over 70% of respondents were using customer transactions, while channel, market, product, service and fraud data were being used by over 30%. It is also worth noting that the existing data in an organization (transactions, clickstream, content from Office documents) is seen as the major use of Big Data by 60% of respondents, today and in 3 years.

It's About Variety, Not Volume

Interestingly, the survey indicates companies are focused on the variety of data, not its volume, both today and in three years. The breadth of applications and data domains cited leads to a logical, yet surprising result: the most important goal and potential reward of Big Data initiatives is the ability to analyze diverse data sources and new data types, not managing very large data sets.

This theme was reinforced in responses to the defintion of Big Data. 40% of the respondents' comments mentioned data variety, complexity, and quality, while only 10% mentioned data volume:

> "Our problem is less about volume and more about variety."

> "... we don't see the need to confine Big Data techniques to uniquely Big Data problems. We look at them as new tools in the tool kit."

This aligns with the types of data focused on by the respondents. Marrying transactional, unstructured, and clickstream data together for analysis is a challenging, perennial problem with high potential business value. The prospect of adding new data sources, from social media to sensor data, may provide an incremental benefit, but is not the primary focus of companies now or in 3 years. Most respondents are using Big Data to attack known problems (integrating and analyzing diverse data) from known data sources. [Figure 7]

Figure 7
What data domains are you most focused on in Big Data initiatives?
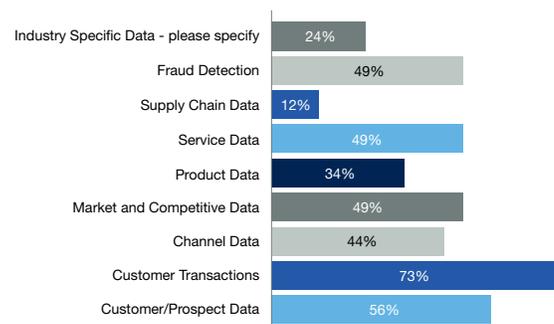
This emphasis on analyzing known data sources was reflected in the data structures that respondents expected to use. Relational data models are the most common standard used in Big Data projects, followed by unstructured text and time-series data, now and in 3 years. While the NoSQL models have some advantages, the structure of existing data assets and SQL skill base still makes relational models central to most Big Data initiatives. These two responses to the definition of Big Data were typical:

> "We include structured data in the definition. We agree that video, photos and other multimedia format are part of the definition, but we don't touch those spaces."

> "The only qualifier is the convergence of analytics across varieties (e.g. analytics that span structured and unstructured). The most significant challenge is creating the bridge to legacy technology and data, you can't ignore your past."

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New Insights, Not New Data

New analytic discovery is driving many of the Big Data initiatives. Most respondents intend to use Big Data to garner new discoveries and insights from their data assets, over improving accuracy of existing models or accelerating the analysis process, and they expect discovery analytics to be the primary focus 3 years from now. This is significant in two ways. First, it reflects a belief that there is still a lot of untapped value in existing data assets and that new discoveries will not require entirely new data sources. This theme runs counter to much of the Big Data discussion, which emphasizes the value of external data, such as social media. Second, it implies that discovery is more important than optimization or automation, which has been a major focus of traditional business intelligence. There may be a bit of "irrational exuberance" in this focus on discovery, which has a longer and less certain path to value than focusing on improving processes that are already in place.

Organizational Alignment is Critical to Success

Big Data initiatives need to address organizational and data silos to achieve success. 80% of the respondents saw Big Data initiatives as reaching across more than one line-of-business or function, with a significant focus on "integrating a wider variety of data" from across the enterprise. This requires alignment and coordination across business units, as well as solid capabilities for accessing data, performing analytics, and applying the insights.

The survey revealed that IT and the business units have very different perceptions about the state of big data and their readiness to for it. 61% of IT respondents thought that access to data was "less than adequate," while only 46% of data users (analysts or business users) gave this rating. The ability of executives and business leaders to use data and analytics to improve or transform the business revealed an even bigger gap: 57% of IT felt that it was "less than adequate" while only 18% of business users gave this rating. This mismatch in perceived capabilities indicates that alignment is clearly an issue.

Another challenge is the data itself. Many respondents felt that accessing existing data sources, and understanding which new ones are most worthwhile, will be a barrier to generating value. More than half did not have adequate access to relevant, accurate, and timely data now, and cited the following as the biggest challenges to adopting big data:

"We receive consumer data from multiple sources, each with often differing permissions for use. Tying those together in a compliant/appropriate way while maintaining and enforcing explicit usage rights for different data components, is a significant challenge."

"Sourcing and discriminating the relative value of different types and sources of input data; then internal hurdles to accessing transactional data (cost & data sharing restrictions)"

"Siloized and inefficient and data infrastructure"

Biggest Roadblock May Be More About People Than Technology

Big Data has the potential to provide answers to many key questions for businesses, but to get an answer, you first need to know what questions to ask and this is driven by people, not technology. The Big Data opportunity carries with it a huge challenge around organizational development and change. More than just new technical skills, organizations are looking to create new roles, processes, and programs to leverage Big Data.

A lack of understanding, business drivers, and priorities were cited as some of the biggest challenges to using Big Data:

"Lack of knowledge on the possibilities. For many it is still a fancy IT thing."

"To make sure we properly define the problems we are trying to solve."

"Finding a solid use case. Most use cases are notional. We know what it can do generally, but we can't quantify it down to a specific use case that will pass the CBA process and get funding"

"Conveying the business value and getting adequate funding. Painting the business vision of why a whole new approach to data infrastructure is needed to harness the business value from Big Data."

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Although many organizations had a large staff of strong analysts, most were very concerned about developing and acquiring skills needed to leverage Big Data. All respondents cited having issues in sourcing analytical skills and over 75% said it was "challenging." [Figure 8]

Figure 8
How challenging is it to source analytical skills in general?

Impossible to find or hire sufficient sources — 4%
Very difficult to find or hire — 36%
Challenging — 36%
Somewhat challenging — 24%
No issues in finding skilled
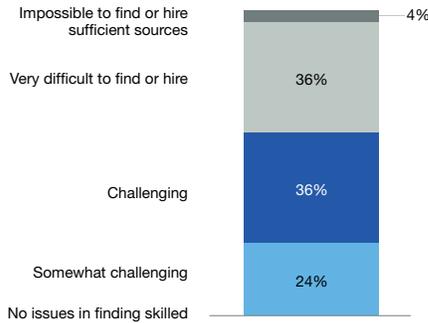
One of the biggest challenges is filling the new role of the "data scientist," which 70% of organizations planned on hiring. The survey defined data science as a discipline, still somewhat loosely defined, that incorporates applying varying degrees of statistics, data visualizations, computer programming, data mining, machine learning, and database engineering to solve complex data problems. 80% of the respondents said it was challenging to fill this role.

Despite the hiring challenge, respondents' primary method for building this talent is hiring new people. Even companies with years of analytic expertise at large scale (>500 analysts) believe that Big Data skills cannot be met through additional training.

Organizations are looking outside their industry to find data scientists. Firms are hiring advanced-degree graduates and Silicon Valley veterans to bring this new skill in-house.

Many respondents cited skills as the biggest challenge to using Big Data:

"Finding people who understand the sources of data and how to analyze and leverage"

"Staff not trained to deal with admin or use of hadoop distributions. Landscape is very unsettled, tools are immature."

"..skills on tools (technical and analytical)..."

"Adjusting to a new methodology for analytics vs traditional modelling process."

As these individual issues are addressed, organizations are concerned that their ability to change will end up being the biggest barrier to success:

"Challenges with adoption of new technologies and educating end users."

"Big Data is potentially threatening to old line information vendors who competed on the ability to horde data, whether unique or commoditized. Big Data requires you to think differently about the traditional operating model."

"Institutional inertia favoring conventional systems"

"– entrenched, single purpose data sets and owners – lack of clarity and confidence around "payoff" – data sharing/usage policies – rethinking BI and data mining with today's technologies/tools vs. traditional pathways"

"Getting comfortable with data being hosted; analytic tools and capabilities needed to manage the data"

"Create organizational alignment across boundaries to take action on a more holistic view of customers"

Managing change requires experience applying insights and analytics to business solutions, and many firms felt they had an adequate ability to do so. However, expanding these teams with new leadership that understands Big Data and its application is viewed as very challenging. 43% rated "the ability, by executives and business leaders, to use data and analytics to improve or transform business" as less than adequate.

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Conclusion

The promise of "Big Data" has been a dominant theme in both the business and technology press for several years. It has been defined and written about by numerous consulting and technology organizations. Yet the objectives of most of these Big Data initiatives are nothing new. Companies have been trying to leverage data to help improve their businesses for years. Some of the tools and capabilities are new, and certainly the economics of accessing and storing data have improved, but many of the challenges are the same.

Big Data is not a panacea. It holds many promises, but those promises can only be realized if companies put together thoughtful strategies and build organizations with the requisite skills, processes, and systems to pursue a coherent, productive data strategy. There also must be a coordinated and cooperative effort across organizations to realize the potential offered by Big Data. Companies need to go into these initiatives with clear goals and expectations, and an acute awareness of the requirements on their part necessary to ensure success. Big Data does indeed hold huge potential for companies, but realizing that potential will only come with careful formulation of sound strategies accompanied by thoughtful execution plans.

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Appendices

Appendix A – Participating Companies

Banking

Bank of America

Bank of New York Mellon

CitiGroup

JP Morgan

RBS Citizens Financial

State Street Bank

US Bank

Wells Fargo Bank

Insurance | Health Care

Aetna

Broad Institute

Cigna

CVS/Caremark

The Hartford

Harvard Pilgrim Health Care

SunLife Financial

Travelers

United Healthcare

Investments

Charles Schwab

Conning Asset Management

Fidelity Investments

ING

Putnam Investments

TD Ameritrade

TIAA-CREF

Wellington Financial

Other Business and Financial Services

American Express

Freddie Mac

General Electric (GE)

MasterCard

Pitney Bowes

Thomson Reuters

VISA

Wright Express

Media and Technology

Avid Technology

Time Warner Cable

Government

Department of Defense (DOD)

General Services Administration (GSA)

Department of Health and Human Services (HHS)

Social Security Administration (SSA)

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